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U. S. Patents

VOLUME V
GRAPHOPHONE PATENTS
705,126 - 763,904

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<u>L.</u>	Lambert, T.B.,	742,454;
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	LeFevre, Z.J.,	755,506;
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<u>M.</u>	Macdonald, T.H.,	711,706;
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	"	713,477;
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<u>O.</u>	Osten & Spalding, Outten, W.B.,	705,126; 719,361;
<u>P.</u>	Palmer, E.T., Pearce, F., Peisker, W., Petri-Palmedo, D., Pettit, A.N., " " " " " " " " " Possons, M.A.,	758,466; 761,705; 708,581; 722,616; 708,828; 710,299; 728,607; 735,579; 736,773; 739,713; 749,092; 750,118; 750,119; 741,543;
<u>Q.</u>		
<u>R.</u>	Reinhardt, C.C., Romano, E.J., Runge, W.C., "	742,233; 729,798; 725,878; 756,289;
<u>S.</u>	Sheble, H., Shigley, C.C., Skiff & Grant, Solon, T.F., Storms, J.E., Jr., Sturges, H.,	759,639; 727,002; 754,508; 760,655; 714,620; 763,808;
<u>T.</u>	Tainter, C.S., Tourtel & Hogan, Tures, W.,	730,986; 761,729; 722,776;
<u>U.</u>		
<u>V.</u>	Valiquet, L.P., " " " " Villy, G.H., Vogel, P.,	705,165; 713,722; 717,953; 759,142; 759,143; 739,954; 746,609;
<u>W.</u>	Walcutt, C., Weber, P., " Wellner, J., Wieder, H.G.A.I., Winkelmann, H., Wood, G., Worthington, M.M.,	733,521; 744,266; 744,267; 734,206; 708,849; 707,749; 735,926; 706,627;

X.
Y.
Z.

No. 705,126.

Patented July 22, 1902.

G. OSTEN & W. P. SPALDING.

HORN FOR SOUND RECORDING AND REPRODUCING APPARATUS.

(Application filed June 27, 1901.)

(No Model.)

Fig. 6.

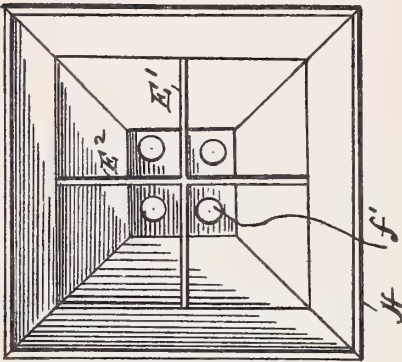


Fig. 3.

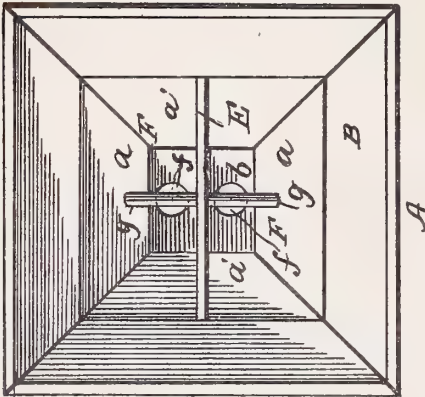
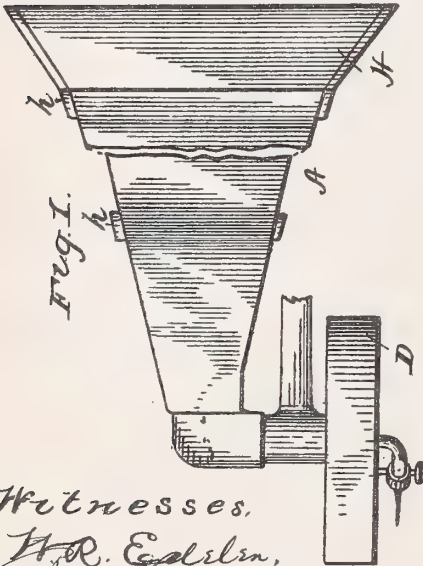


Fig. 1.



Witnesses,
H. R. Edelin,
J. W. Lewis

Fig. 4.

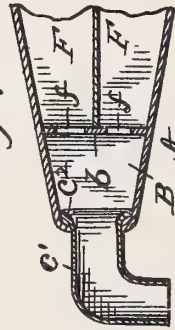


Fig. 5.

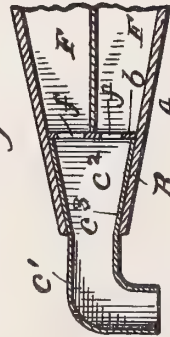
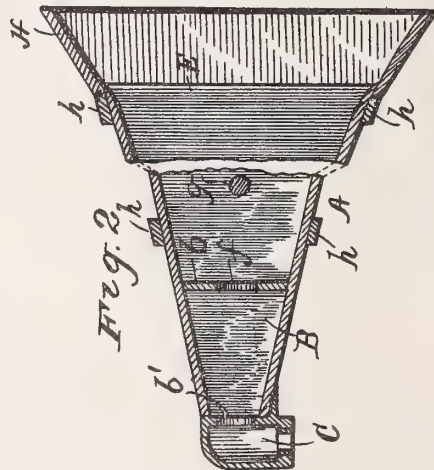


Fig. 2.



Inventors
George Osten and
William P. Spalding
by Thos. Mauro atty.

UNITED STATES PATENT OFFICE.

GEORGE OSTEN AND WILLIAM P. SPALDING, OF DENVER, COLORADO.

HORN FOR SOUND RECORDING AND REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 705,126, dated July 22, 1902.

Application filed June 27, 1901. Serial No. 66,301. (No model.)

To all whom it may concern:

Be it known that we, GEORGE OSTEN and WILLIAM P. SPALDING, residents of Denver, Colorado, have invented a new and useful Improvement in Horns for Sound Recording and Reproducing Apparatus, which invention is fully set forth in the following specification.

Our Patent No. 685,409, dated October 29, 1901, claims a multiple horn consisting of a plurality of small horns all communicating at their smaller ends with one and the same recorder or reproducer and a hood or bell common to all of the small horns and into which said small horns discharge or from which they receive the sounds at their larger ends.

Although the apparatus of our present invention, in its preferred form, includes the features of construction above referred to, as well as the transmitter described in said patent, the present invention is designed more particularly as an improvement upon the patented invention.

We have discovered that a large horn, of any suitable material, partitioned into a plurality of small horns by a partition or partitions, preferably of wood, acting as a sounding-board, gives improved results, and that still better results are obtained by the use of sound-posts in conjunction with the sounding-board partition or partitions. The manner in which we utilize these discoveries will be best understood by reference to the accompanying drawings, illustrating several embodiments of our invention, and wherein—

Figure 1 is a plan view showing a recorder or reproducer connected with the horn. Fig. 2 is a longitudinal sectional view of the horn. Fig. 3 is a view looking into the large end of the horn. Figs. 4 and 5 are views illustrating modifications of the elbow leading to the recorder or reproducer. Fig. 6 is a view looking into the larger end of a modified construction of horn.

A is the body of the horn, which, as shown, is made of four tapering thin wooden sides $a a' a'$, secured together along their edges, thus forming a body part of rectangular cross-section. The body part may, however, be made of circular, oval, or any other suitable shape in cross-section.

B is a distributing chamber or mouth at

the small end of the horn, bounded at one end by a transverse partition or wall b . At its smaller end mouth B communicates, through an opening b' , with a throat C, leading through a wooden elbow or short tube c , which is secured to the small end of the horn. Elbow or short tube c may be bent, as shown, or straight. At its outer end throat C communicates with a reproducer or recorder D, Fig. 1.

E is a sounding-board extending forward from partition b , secured at its side edges to the opposite sides $a' a'$ of body A and longitudinally dividing the interior of the latter into two small horns F F, which communicate with the distributing chamber or mouth B through openings $f f$ in partition b on opposite sides of the sounding-board E.

$g g$ are two sound-posts interposed between the sounding-board E and the sides $a a$. They communicate vibrations from the sounding-board to the sides of the horn, and vice versa.

$h h$ are outside strips or ribs extending across sides $a' a'$ in a direction practically parallel to the sound-posts and acting to strengthen the tone and vibrations, as well as making the horn more durable. The sound-posts and ribs are of special importance, as they act in practically the same manner as do the sound-post and ribs of a violin. They improve the tone quality by softening and mellowing the same, at the same time increasing the carrying properties and distinctness of the sounds, particularly where the horn is made completely of wood. The metallic sound so common to sound recording and reproducing apparatus is effectually eliminated.

Any double effect that may otherwise be produced by the sounds coming from the two small horns F F is avoided by the action of the single bell or hood H, into which both of said small horns discharge, said hood causing the sounds coming from the separate small horns to blend together before they are finally discharged from the horn. As shown in the drawings, hood H is also made of wood and secured to the end edges of sides $a a' a'$.

As shown in Fig. 4, the elbow c' instead of being made of wood, as in Figs. 1 and 2, is made of brass or other suitable metal and has a flared or bell-shaped end c^2 opening into the distributing-chamber B. Fig. 5 illustrates a somewhat-similar arrangement, the flared or

bell-shaped end c^8 of the elbow in this casing being of such length as to constitute a lining for the chamber B.

In the form of horn shown in Fig. 6 two sounding-boards E' E^2 , disposed at right angles to each other longitudinally, divide the interior of the horn into four small horns, each communicating with the distributing-chamber, such as shown in Fig. 2, through an opening f' . As the sounding-boards bear against all of the sides of the horn, no sound-posts are necessary in this arrangement.

What we claim is—

1. In sound recording and reproducing instruments, the combination of a multiple horn comprising a plurality of small horns separated from each other by a sounding-board, with a sound recorder or reproducer in communication with said multiple horn.

2. A multiple horn comprising a plurality of small horns separated from each other by a sounding-board and a common distributing chamber or mouth with which the small horns communicate at their smaller ends.

3. A multiple horn comprising a wooden body part divided interiorly into a plurality of small horns by a wooden sounding-board.

4. A horn comprising a plurality of small horns separated from each other by a sounding-board, a common distributing chamber or mouth with which the small horns communicate at their small ends, and a hood or bell common to all of the small horns and into which said small horns discharge or from which they receive the sounds at their larger ends.

5. A horn comprising a body part adapted to communicate at its small end with a recorder or reproducer, a lateral partition in the body part forming a mouth or distributing-chamber at the smaller end of the horn,

and a longitudinally-extending sounding-board dividing the interior of the body part outside of the mouth into two small horns communicating with the mouth through openings in the lateral partition.

6. A horn comprising a body part adapted to communicate at its small end with a recorder or reproducer, a lateral partition in the body part forming a mouth or distributing-chamber at the smaller end of the horn, a longitudinally-extending sounding-board dividing the interior of the body part outside of the mouth into two small horns communicating with the mouth through openings in the lateral partition, and a hood or bell common to all of the small horns and into which said horns discharge or from which they receive the sounds at their larger ends.

7. A horn for use with apparatus for recording and reproducing sounds having a sounding-board longitudinally disposed therein.

8. A horn for use with apparatus for recording and reproducing sounds having a sounding-board longitudinally disposed therein and a sound-post interposed between the sounding-board and side wall of the horn.

9. A wooden horn for use with apparatus for recording and reproducing sounds having a wooden sounding-board longitudinally disposed therein and a sound-post interposed between the sounding-board and side wall of the horn.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

GEORGE OSTEN.

WILLIAM P. SPALDING.

Witnesses:

W. A. RICE,

L. GOLDMAN.

57/63

No. 705,165.

Patented July 22, 1902.

L. P. VALIQUET.

HORN SUPPORTING ARM FOR TALKING MACHINES.

(Application filed Mar. 19, 1902.)

(No Model.)

2 Sheets—Sheet 1.

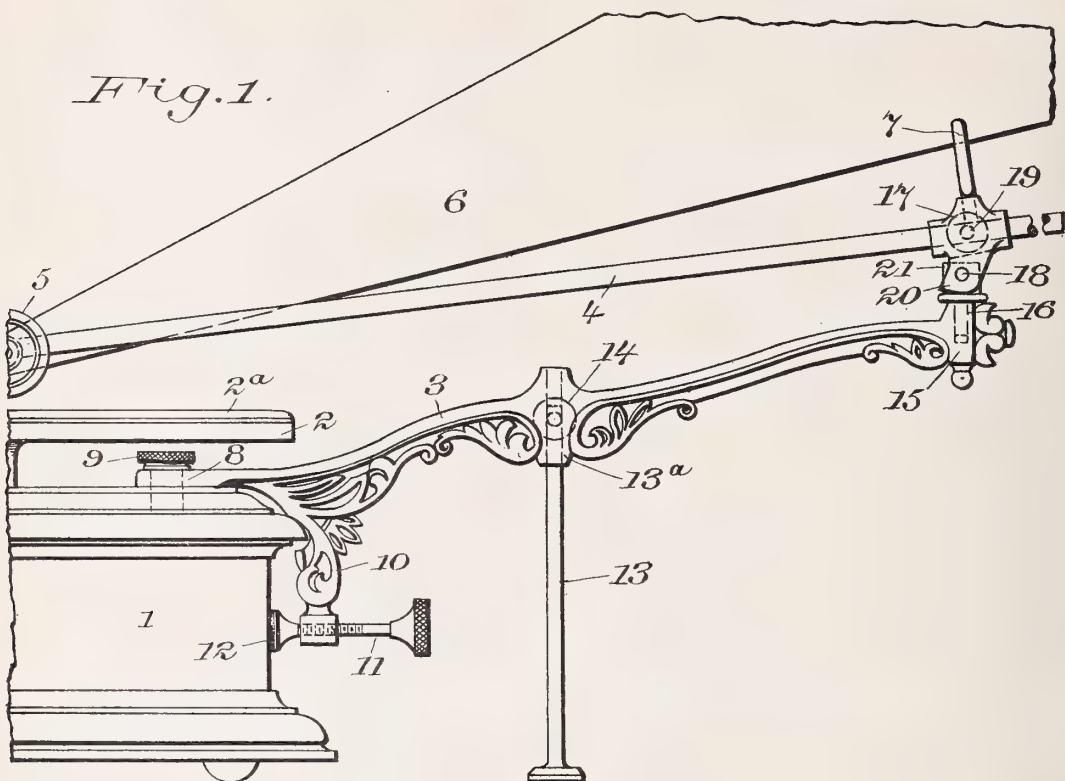


Fig. 2.

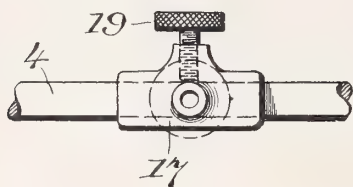


Fig. 3.

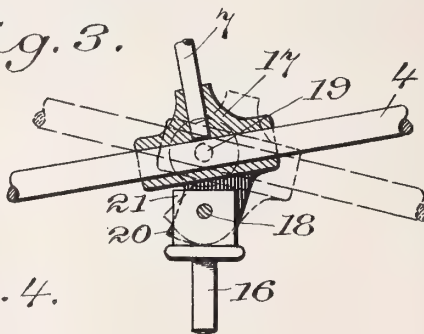
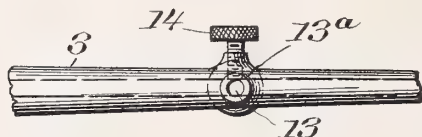


Fig. 4.



WITNESSES:

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W. H. Humphrey

INVENTOR

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BY *Mark Smith*
ATTORNEY



No. 705,165.

Patented July 22, 1902.

L. P. VALIQUET.

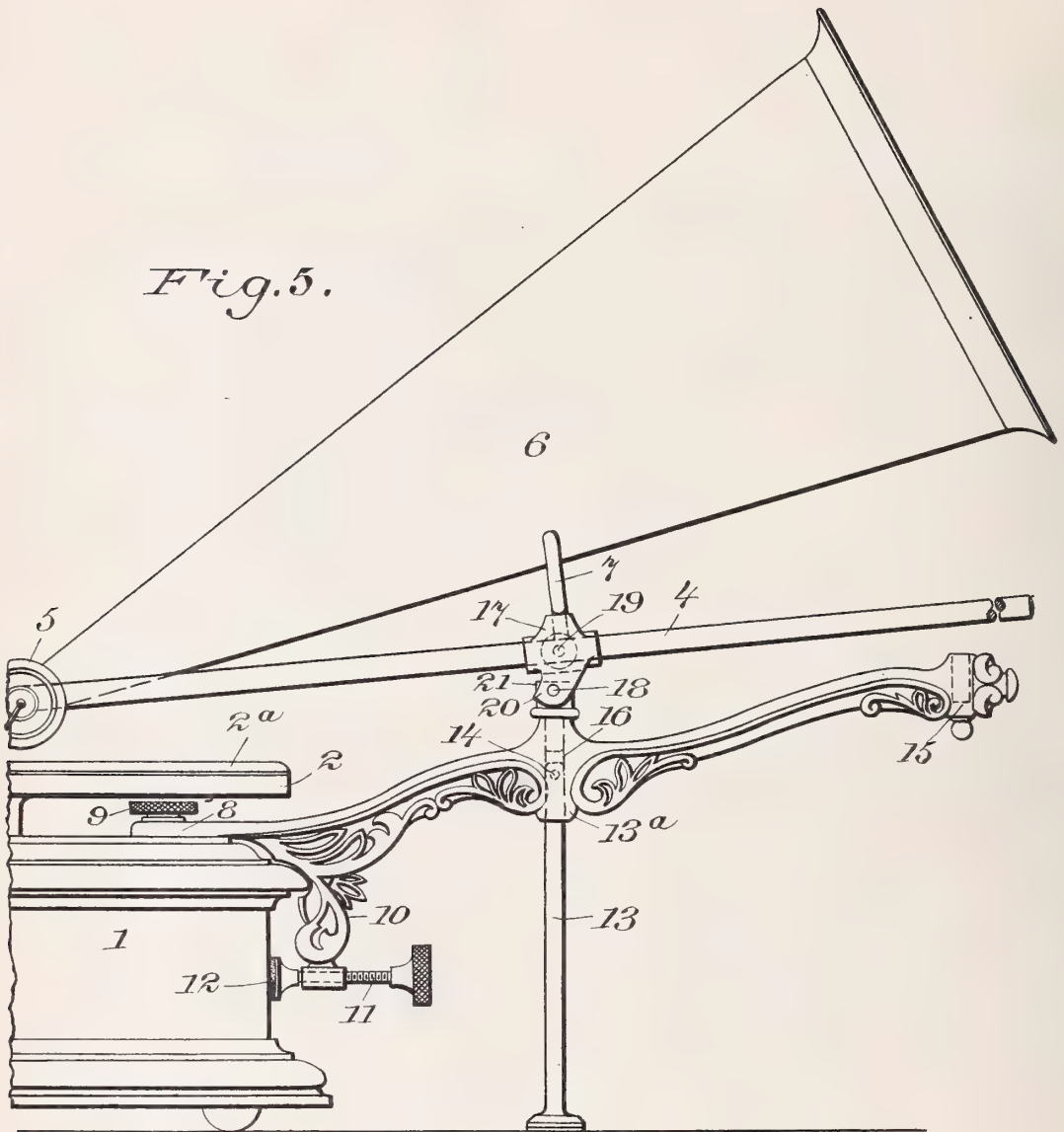
HORN SUPPORTING APM FOR TALKING MACHINES.

(Application filed Mar. 19, 1902.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 5.



WITNESSES:

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W. H. Humphrey

INVENTOR

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BY *A. P. Schmidt*
ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

HORN-SUPPORTING ARM FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 705,165, dated July 22, 1902.

Application filed March 19, 1902. Serial No. 98,923. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of the borough of the Bronx, city, county, and State of New York, have invented certain new and useful Improvements in Horn-Supporting Arms for Talking-Machines, of which the following is a specification.

My invention relates in general to sound-reproducing apparatus, and more particularly consists of an improved arrangement for supporting horns of different length employed on such apparatus for magnifying the volume of the reproduction of sound. As illustrated, the invention is applied to that type of sound-reproducing apparatus employing a sound-record in the form of a flat disk, though it may also be used with other forms of talking-machines.

In the development of the talking-machine art the use of longer horns has become general in order to increase the loudness of the reproduction. These require the use of long supporting-brackets, which are liable to bend and sag under the very considerable weight of the long horn. Moreover, the great length of the horn frequently brings the center of gravity of the whole apparatus outside of the supporting-base, with the result that the machine tips over when the long horn is put in position. My invention overcomes these difficulties and also provides a construction in which horns of different length can be supported from the same bracket-arm.

The preferred form of my invention is illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a side elevation of a machine having a long horn in position, certain parts being broken away. Fig. 2 is a detail plan view of a portion of the swinging arm with the sliding hinge thereon. Fig. 3 is a side elevation and partial section of parts shown in Fig. 2. Fig. 4 is a detail plan view of a part of the supporting-bracket, and Fig. 5 is a side elevation of the machine with a short horn in position.

Throughout the several figures of drawings like reference-figures indicate like parts.

The talking-machine consists of the usual casing 1, containing a spring-motor, which rotates the table 2 on which rests the sound-record 2^a. A bracket 3, attached to said casing, supports the swinging arm 4, which carries the sound-box 5 and horn 6, the outer end of which is supported by the fork 7. The inner end of the bracket 3 has an eye 8 formed therein and is attached to the motor-casing 1 by any suitable means, such as a thumb-screw 9, passing through said eye.

The bracket 3 has a depending lug 10, in which is mounted a screw 11 or other adjustable part adapted to engage the side of the motor-casing. Preferably the screw 11 has a facing 12 of felt or other soft material which will not mar the polish of the motor-casing.

A depending support 13 has its upper end resting in a socket 13^a, formed in the bracket 3, and is preferably held adjustably therein by the set-screw 14. The lower end of the support reaches to the table or other surface on which the machine stands.

In the outer end of the bracket 3 is a socket 15, in which rests the pivot 16. A sliding block 17 is mounted on the arm 4 and connected to the pin 16 by a hinged joint having a horizontal axis 18. The block 17 carries the fork 7 and is held at the proper point on the arm 4 by the set-screw 19. The intermeshing portions 20 and 21 of the hinged joint are so shaped that the motion of the hinge is limited in either direction, as shown in Fig. 3.

The method of operating my invention is clear from the foregoing description. In shipping the machine the bracket 3 is detached from the motor-casing. When the machine is to be set up, the bracket is attached to the motor-casing by means of the screw 9. The screw 11 is then turned until the parts are all placed in a state of strain, which insures the rigidity of the bracket with reference to the casing. The ornamental web extending from the under side of the bracket to the lug 10 serves also to give rigidity to the parts. The depending support 13 is placed in position so that its lower end rests upon the table and is then clamped there by the set-screw 14. If a long horn is to be used, the pivot-pin 16 is placed in the

socket 15, the sliding hinge - block 17 is clamped to the arm 4 at the proper point by means of the set-screw 19, the fork 7 is mounted in said hinge-block, and the sound-box 5 and horn 6 placed in position. If a short horn is to be used, the pivot-pin 16 is placed in the socket 13^a, with the resultant rearrangement of parts shown in Fig. 5 to vary the effective length of the reproducer-arm.

10 The shapes of the interlocking portions 20 and 21 of the supporting-hinge are such that they allow the necessary movement of the arm 4 and sound-box 5 to produce engagement and disengagement of the reproducer 15 with the sound-record 2^a. If, however, the arm is swung to one side of the record, its downward movement is checked in the position shown in full line, in Fig. 3, before the stylus can strike the surface of the table on 20 which the machine stands. If, on the other hand, the arm is raised to the position shown in dotted lines in Fig. 3, the center of gravity of the arm, sound-box, and horn will be shifted to the right of the axis 18 of the 25 hinge, and further movement being checked by the engagement of the parts 20 and 21 the parts will remain in that position of disengagement between record and reproducer while the record is being changed or any 30 other desired operation is being performed.

The advantages of my invention comprise the stability of the machine when a long horn is used and the rigidity of all the parts, whereby internal vibrations and rattling, 35 which tend to destroy the accuracy of the reproduction, are avoided, also the facility of using both long and short horns with the same supporting apparatus, convenience in taking apart and assembling the different portions 40 of the mechanism, and the general ease and convenience of manipulation.

Of course various changes could be made in the details of construction illustrated and described without departing from the spirit 45 and scope of my invention. The means of attachment of the bracket to the motor-casing might be changed and also the form of the adjustable depending lug. Other forms of supporting devices might be substituted 50 for the rod 13. Other forms of hinged joint and pivot connection might be employed and different means for supporting the horn substituted for the fork 7. Other means for varying the effective length of the reproducer-arm might be employed. In case a 55 short horn is used the support 13 may be dispensed with, as shown in Fig. 5. These and other changes which might be made, however, are merely matters of detail, and I should 60 consider the construction so modified as still within the boundaries of my invention so long as the principles of construction above described are retained.

Having, therefore, described my invention, 65 what I claim as new, and desire to protect by Letters Patent, is—

1. In a sound-reproducing apparatus, the

combination of the motor-casing, a bracket-arm having an eye formed in its inner extremity and a downwardly-projecting lug 70 thereunder, fastening means passing through the eye and engaging the upper part of the motor-casing, and an adjustable extension of the before-mentioned lug adapted to engage the side of the motor-casing. 75

2. In a sound-reproducing apparatus, the combination of the motor-casing, a bracket-arm having an eye formed in its inner extremity and a downwardly-projecting lug 80 thereunder, fastening means passing through the eye and engaging the upper part of the motor-casing, and an adjustable extension of the before-mentioned lug adapted to engage the side of the motor-casing, together with a depending adjustable support for said 85 bracket-arm.

3. In a sound-reproducing apparatus adapted to operate with a swinging reproducer and horn attached thereto, the combination of a motor-casing, a bracket-arm attached thereto, 90 and means for pivoting thereto at various points in its length reproducer-arms of different radii together with a reproducer-arm whose effective length may be varied.

4. In a sound-reproducing apparatus adapted to operate with a swinging reproducer and horn attached thereto, the combination of a motor-casing, a bracket-arm attached thereto, 95 and means for pivoting thereto at various points in its length reproducer-arms of different radii, together with a swinging reproducer-arm having a supporting-pivot adjustable lengthwise thereof. 100

5. In a sound-reproducing apparatus, the combination of the rotating record-carrying 105 table, the reproducer, horn, and swinging arm therefor, the supporting-bracket, the vertical pivot-pin journaled therein, a hinged joint between said pivot-pin and arm having a horizontal axis, the intermeshing portions 110 of said hinged joint being so shaped that the motion of the arm in a vertical plane is checked on either side, as the center of gravity of the horn and arm reaches a predetermined distance beyond a perpendicular line 115 drawn through the pivot.

6. In a sound-reproducing apparatus, the combination of a motor-casing, a bracket-arm, means for fastening the inner end of said bracket-arm to the upper surface of the 120 motor-casing, and a depending lug from said bracket engaging one of the sides of the motor-casing.

7. In a sound-reproducing apparatus adapted to operate with a swinging reproducer, the 125 combination of a sliding block adjustable on said arm, and pivot-pin hinged to said block.

Signed at New York city, New York, this 17th day of March, 1902.

LOUIS P. VALIQUET.

Witnesses:

W. H. PUMPHREY,
L. E. PEARSON.

No. 705,636.

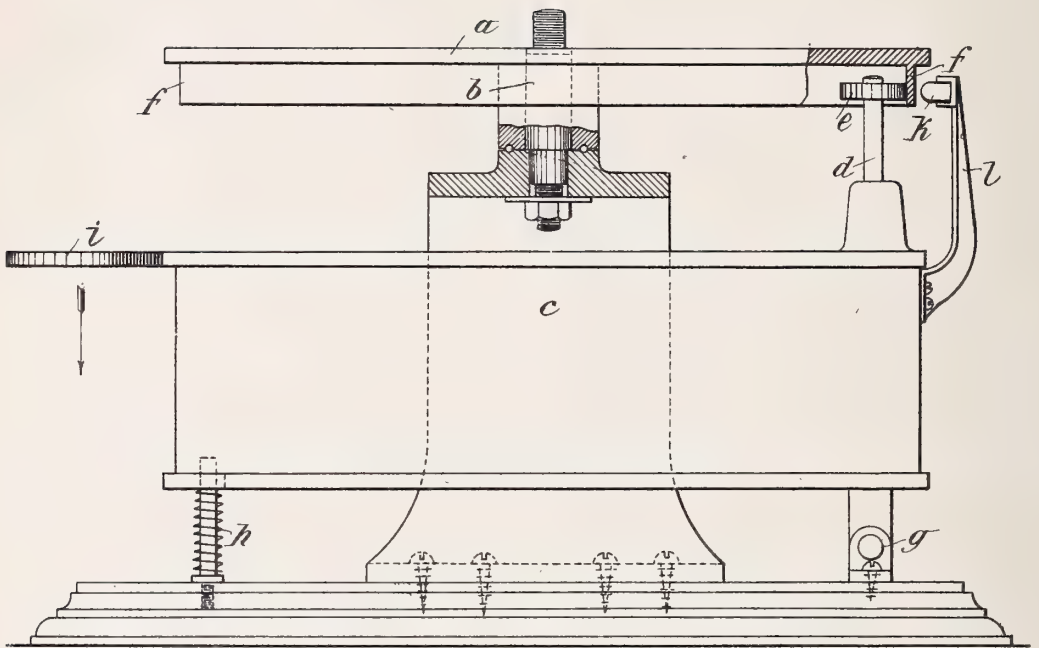
Patented July 29, 1902.

T. BIRNBAUM.

DRIVING MECHANISM FOR ROTARY GRAMOPHONE TURN OR SUPPORTING PLATES.

(Application filed Oct. 19, 1901.)

(No Model.)



Witnesses
J. J. McCarthy
Sam Gillman, Jr.

Inventor
Theodore Birnbaum
by Fisher & Freeman,
Attorneys

UNITED STATES PATENT OFFICE.

THEODORE BIRNBAUM, OF BERLIN, GERMANY.

DRIVING MECHANISM FOR ROTARY GRAMOPHONE TURN OR SUPPORTING PLATES.

SPECIFICATION forming part of Letters Patent No. 705,636, dated July 29, 1902.

Application filed October 19, 1901. Serial No. 79,251. (No model.)

To all whom it may concern:

Be it known that I, THEODORE BIRNBAUM, managing director, a subject of the King of Great Britain and Ireland, residing at 36 Ritterstrasse, in the city of Berlin, in the German Empire, have invented certain new and useful Improvements in Driving Mechanism for Rotary Gramophone Turn or Supporting Plates, of which the following is a specification.

This invention has reference to means for operating gramophones, and in particular to a stopping device by means of which the gramophone turn or supporting plate is disengaged from the operating mechanism, so as to be able to arrest the said gramophone turn-plate, which acts as a support for the record-plate of the gramophone.

The nature of the improvement consists in so arranging the driving mechanism for the operation of the gramophone turn-plate that the said mechanism is capable of rotation about a horizontal axis, the rotating movement causing the driving mechanism to become uncoupled from the rotary gramophone turn-plate.

The nature of my invention will be better understood from the accompanying diagrammatic sketch.

a is the gramophone turn-plate, capable of rotary movement and pivotally journaled in the usual manner upon the vertical shaft *b*. Below the said gramophone turn-plate is a casing *c*, which contains the driving mechanism, which is operated either by electricity or by spring action and which causes the rotation of the driving-shaft *d*, upon the upper extremity of which I mount a friction-disk *e*, contacting with the rim *f* of the gramophone turn-plate. Thus if the shaft *d* is rotated the gramophone turn-plate *a* will also be revolved by means of the friction-disk *e*.

It will be seen from the drawing that the driving mechanism is pivoted at *g* upon screws or bolts. A spring *h* at the opposite side has the tendency of raising the casing *c* for the driving mechanism, thereby forcing the friction-disk *e* against the rim *f* of the gramophone turn-plate *a*. This arrangement is necessary, so as to insure sufficient friction between the friction-disk *e* and the rim *f* of the rotary gramophone turn-plate and to

transmit the rotation of the shaft *d* upon the rotary gramophone turn-plate *a*. In order to stop the movement of the gramophone turn-plate, it becomes only necessary to depress the casing *c* by means of a handle *i*, for instance, against the upward pressure of the spring, thereby removing the friction-disk *e* from contact with the rim *f* and stopping the gramophone-plate in its rotary movement. This downward movement of the casing *c* and its rotation about the axis *g* may also be easily combined with means for arresting the driving mechanism both whether the source of movement is derived from electricity or from spring action. In the latter case of a spring-actuated motor I may, for instance, make use of a suitably-arranged ratchet-pawl which engages with the moving gear of the said driving mechanism. If a motor driven by electricity furnishes the power for operating the gramophone, the descending movement of the casing may be employed to actuate an electric switch or cut-out in any simple and well-known manner. Simultaneously with the disengagement of the friction-disk with the rim *f* of the gramophone turn or supporting plate a brake-shoe *k* may be forced against the outside rim *f* of the said gramophone turn-plate, so as to cause an absolute stoppage of the gramophone turn-plate at the moment of interrupting the contact between the disk *e* and the rim, as otherwise without the application of a brake the gramophone-disk would still continue to move for a short distance, owing to its momentum, after the driving mechanism itself is stopped. The brake-shoe *k* is preferably attached to an arm *l*, attached to the casing *c*, so as to operate the brake *k* simultaneously with the disengagement of the friction-disk *e*.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In an actuating mechanism for a rotatable supporting-plate, the combination with such plate, of a casing pivotally supported at one side, a driven shaft *d* journaled in the casing, a friction-disk carried by the shaft and adapted to engage the plate, and a spring-support for the casing opposite its pivotal support normally tending to force the disk into engagement with the plate, substantially as set forth.

2. In an actuating mechanism for a rotatable supporting-plate, the combination with such plate, of a casing pivotally supported at one side, a driven shaft *d* journaled in the casing, a friction-disk carried by the shaft and adapted to engage the plate, a spring-support for the casing opposite its pivotal support normally tending to force the disk into engagement with the plate, and a brake-shoe carried by the casing and normally out of engagement with said plate, said brake-

shoe being supported to engage the plate when the casing is rocked on its pivot to disengage the disk from the plate, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE BIRNBAUM.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

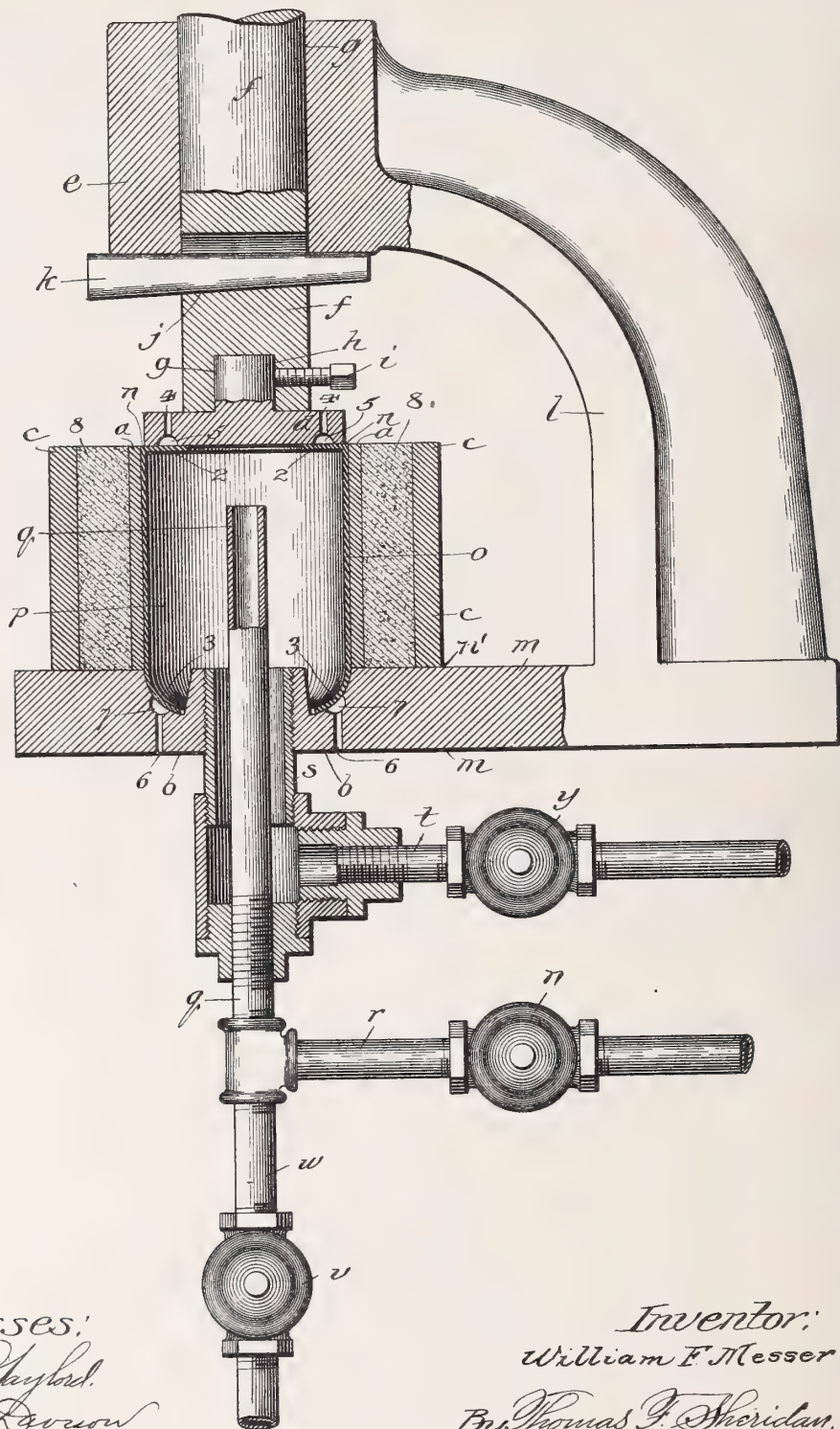
No. 705,772.

Patented July 29, 1902.

W. F. MESSER.
APPARATUS FOR REPRODUCING PHONOGRAMS.

(Application filed Feb. 1, 1902.)

(No Model.)



Witnesses:
Ed. Chubb
Geo. C. Brown

Inventor:
William F. Messer
By *Thomas F. Sheridan,*
Att'y

UNITED STATES PATENT OFFICE.

WILLIAM F. MESSER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LAMBERT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APPARATUS FOR REPRODUCING PHONOGRAMS.

SPECIFICATION forming part of Letters Patent No. 705,772, dated July 29, 1902.

Application filed February 1, 1902. Serial No. 92,110. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. MESSER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Reproducing Phonograms, of which the following is a specification.

This invention relates to that class of apparatus by which duplicate phonographic records in any desired number may be made, and particularly to the production of what are termed "indestructible" records or records made of celluloid or similar infrangible material, and more especially to the production of records having relatively thin walls of celluloid and inwardly-extending annular end flanges.

The principle object of the invention is to provide a simple, economical, and efficient apparatus for reproducing phonograms or record-cylinders in any desired number.

A further object of the invention is to provide means for holding the ends of the record-cylinder in place against the inner walls of the base and head, so as to seal the pressure-chamber while pressure is being applied to force the record-cylinder against the matrix and hold the record-cylinder sufficiently out of intimate contact with the matrix at each end to permit the escape of air from between the ends of the record-cylinder and matrix until the entire outer surface of the cylinder has been pressed against the inner surface of the matrix.

Other objects will appear from an inspection of the drawing and the following description and claims.

The accompanying drawing represents a vertical side elevation in section of one style of an apparatus constructed in accordance with my improvements.

In constructing a machine in accordance with my improvements and using the same I provide a matrix *a* of the desired size, shape, and strength and which is preferably formed in the manner shown and described in Patent No. 645,920, issued to Thomas B. Lambert March 20, 1900. The matrix is in the form of a hollow cylinder open at both ends and is provided on its inner surface with sound-record indentations—that is to say, it has negative indentations corresponding to those

upon the original sound-record—so that when the record-blank receives the imprint of the inner surface of the matrix it becomes a duplicate of the original or master record. This matrix is placed in an upright position upon a base *b*, which forms a closure for one end of the matrix, the natural irregularities of the end of the matrix and surface of the base forming an outlet sufficient to permit the air to escape from between the blank record and matrix. The matrix is surrounded by an encircling metallic shell *c*, between which and the matrix a backing *d*, of plaster-of-paris or similar material, is placed for holding the matrix in place and affording the desired and necessary rigidity and strength to withstand the pressures incident to its operative use. A movable head portion *e* is provided and mounted above the matrix by means of a stem *f*, extending therefrom through a bearing *g* in a stationary head *e*. The stem of the movable head may be integral therewith or connected thereto, as shown, by suitable means, such as the lug *g* upon the head, fitted into a slot or notch *h* in the stem and held in place in such stem by a set-screw *i*, connecting the lug and stem. A transverse perforation *j* is made in the stem of the movable head adapted to receive a wedge *k*, which contacts with the stationary head, and thereby holds the stem and movable head in the desired position with relation to the matrix. A rigid standard *l* and bottom portion *m*, both preferably integral with the stationary head and base, connect such head and base and hold them in fixed rigid relation to each other and should be of sufficient strength to hold the movable head in position against the pressure to be applied between such head and base. The movable head is made of such diameter as to leave a space *n* between it and the matrix when both are in operative position, thus permitting the air to escape from between the record-blank and the matrix when pressure is applied to the inner side of the record-blank. By this arrangement a chamber is formed between the matrix, the movable head, and the base, which chamber is provided with vents *n* and *n'* at the top and bottom of the matrix. A blank record-cylinder *o*, of celluloid or similar material, is then placed within the chamber with its respective ends in contact with the head and base. An inner pres-

sure-chamber p is thus formed between the record-cylinder and the head and base portion, which is or becomes hermetically sealed upon the admission of steam under pressure thereto, as hereinafter described. It is desirable to first soften the record-cylinder, so that it may be expanded against the record-surface of the matrix. In order to accomplish this, a heated fluid, preferably steam under about fifty pounds pressure to the square inch, is forced into the record-chamber through a pressure-supply pipe q , which is connected by means of a branch pipe r with a suitable source of steam-supply. The steam is permitted to escape through an exhaust-pipe s , connected with the outer air by means of a pipe t . The steam is kept at a substantially uniform pressure within the record-chamber, so as to by means of its peculiar heating qualities and other actions soften the record and force it out against the inner indented surface of the matrix. After this has been accomplished the steam-supply is shut off by means of a valve u , and a supply of cold air under pressure is permitted to enter through the supply-pipe q by opening the valve v on a second branch pipe w , which connects with a source of cool air under pressure and keeps up as great or a greater pressure than before. A valve y on the exhaust-pipe may be left open, so that all moisture and steam are blown out of the cylinder formed by the record. When the steam has been blown out, the next step is to close the valve y and permit cool air under pressure to remain in the record-chamber until such blank record is sufficiently cooled and hardened. Thus cooled and shrunk it is easily removed without collapsing.

As shown in the drawings, the record-cylinder is for many purposes preferably made with internal end flanges 2 and 3, and when thin material is used, as above suggested, such flanges are softened as well as the body of the record by the admission of steam under pressure. When steam under pressure is admitted, they are immediately softened and forced against the head on one end and the base on the other, and some of the fluid under pressure naturally escapes around such end before the hermetical seals are formed. If this fluid under pressure is not taken care of immediately—that is, permitted to escape from all contact with the record-surface—or if it is allowed to get between the record and the matrix, there is great danger of the surface of the phonogram being either destroyed or so impaired that it is of little or no value. It becomes necessary, therefore, to provide means by which all fluid, such as air or steam, outside of the hermetically-sealed chamber may be immediately permitted to escape and that the end flanges be hermetically sealed to the head and base as quickly and firmly as possible. In order to accomplish these results, the head portion is provided with perforations 4, arranged in a circle adjacent to

the inner edge of the record and at the desired distance from its outer edge. An annular groove 5 is thus provided in the inner surface of the head, into which the perforations open. In the same manner as above described in connection with the head and for the same purposes with relation to the opposite end flange and base portion perforations 6 and an annular groove 7 are provided in the inner surface of the base portion. By means of these perforations in the head and base, in connection with the other elements described, when fluid under pressure, such as steam, is admitted to the pressure-chamber formed within the record-cylinder it follows the path of least resistance and presses toward the perforations in the head and base, carrying the adjacent flanges of the record-cylinder with it, pressing them tightly in place against the end walls or base and head, and forming a sealed chamber. The perforations being left open throughout the operation of completing the record, the flanges are thus held in position to prevent the escape of steam or other fluid from the chamber within the record-cylinder by forming a sealed connection between the record-cylinder and the head and base. It should be understood, however, that the perforations in the head and base should only be sufficiently large to permit the desired yielding of the record-blank and prevent the escape of the fluid by blowing a puncture through the material of which the flange is formed. I find in practice that perforations one-fiftieth of an inch in diameter serve the purpose. An annular space one five-thousandth of an inch wide is sufficient between the head and matrix to permit the air to escape from between the record-cylinder and matrix and may be formed by either making the head of such diameter as to leave a sufficient space or by holding the head a sufficient distance from the matrix to leave a space of the desired size. I prefer, however, to employ a head of smaller diameter than the inner diameter of the matrix. It will be also readily apparent to those skilled in the art that the annular groove in either the head or base would operate with more or less success to hold the end flanges and thereby the ends of the record-cylinder in place with one vent or perforation communicating with such groove; but I prefer to employ a plurality of perforations or vents.

I claim—

1. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder, and a head portion arranged in contact with the other end of the record-cylinder and provided with outlet means communicating with the inner surface of such head and extending to the outer surface of such record-cylinder, substantially as described.

2. In an apparatus of the class described, the combination of a cylindrical matrix, a base

portion at one end thereof arranged to contact with the end of a blank record-cylinder and provided with outlet means communicating with the inner surface of such base and extending to the outer surface of such record-cylinder, and a head portion arranged in contact with the other end of the blank record-cylinder, substantially as described.

3. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder and provided with perforations extending through such base and communicating with the inner surface thereof, and a head portion arranged in contact with the other end of the blank record-cylinder and provided with perforations in such head communicating with the inner surface thereof, substantially as described.

4. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder arranged within the matrix and provided with a groove in its inner surface and perforated outlet means through such base communicating with the groove, and a head portion arranged at the other end of the record-cylinder forming in connection with the record-cylinder and base a pressure-chamber, substantially as described.

5. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a record-cylinder and provided with a groove in its inner surface and with outlet means through such base communicating with such groove, and a head portion arranged in contact with the other end of the record-cylinder and provided with a groove in its inner surface and with outlet means through such head communicating with the groove, substantially as described.

6. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder, and a head portion arranged in contact with the other end of the blank record-cylinder and providing an opening communicating with the inner surface of the matrix outside of the record-cylinder and provided with perforations communicating with the inner surface of such head, substantially as described.

7. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder and provide a vent communicating with the inner surfaces of the matrix and provided with outlet means communicating with the inner surface of such base and extending to the outer surface of such record-cylinder, and a head portion arranged in contact with the other end of the record-cylinder to form in connection with the record-cylinder and base

a chamber within such record-cylinder, substantially as described.

8. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion at one end thereof arranged to contact with the end of a blank record-cylinder having inwardly-extending end flanges, a head portion arranged in contact with the inner flange on the other end of the record-cylinder provided with perforations communicating with the inner surface of such head at points adjacent to the inner edge of such end flange and extending to the outer surface of such record-cylinder, substantially as described.

9. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion arranged at the end thereof in contact with the end portion of a blank record-cylinder having inwardly-extending flanges, such base portion being provided with perforations communicating with the inner surface thereof at points adjacent to the inner edge of the end flange of the record-cylinder, and a head portion arranged in contact with the opposite end of the record-cylinder and the end flange thereon and provided with perforations through such head communicating with the inner surface of the head at points adjacent to the inner edge of such end flange, substantially as described.

10. In an apparatus of the class described, the combination of a cylindrical matrix, a base portion arranged at one end thereof in contact with the end of a blank record-cylinder and provided with perforations extending through such base and communicating with the inner surface thereof, a head portion arranged in contact with the other end of the blank record-cylinder and provided with perforations in such head communicating with the space between it and the record-cylinder, a frame for holding the base in position, and means for admitting fluid under pressure to the chamber formed within the record-cylinder between the base and head, substantially as described.

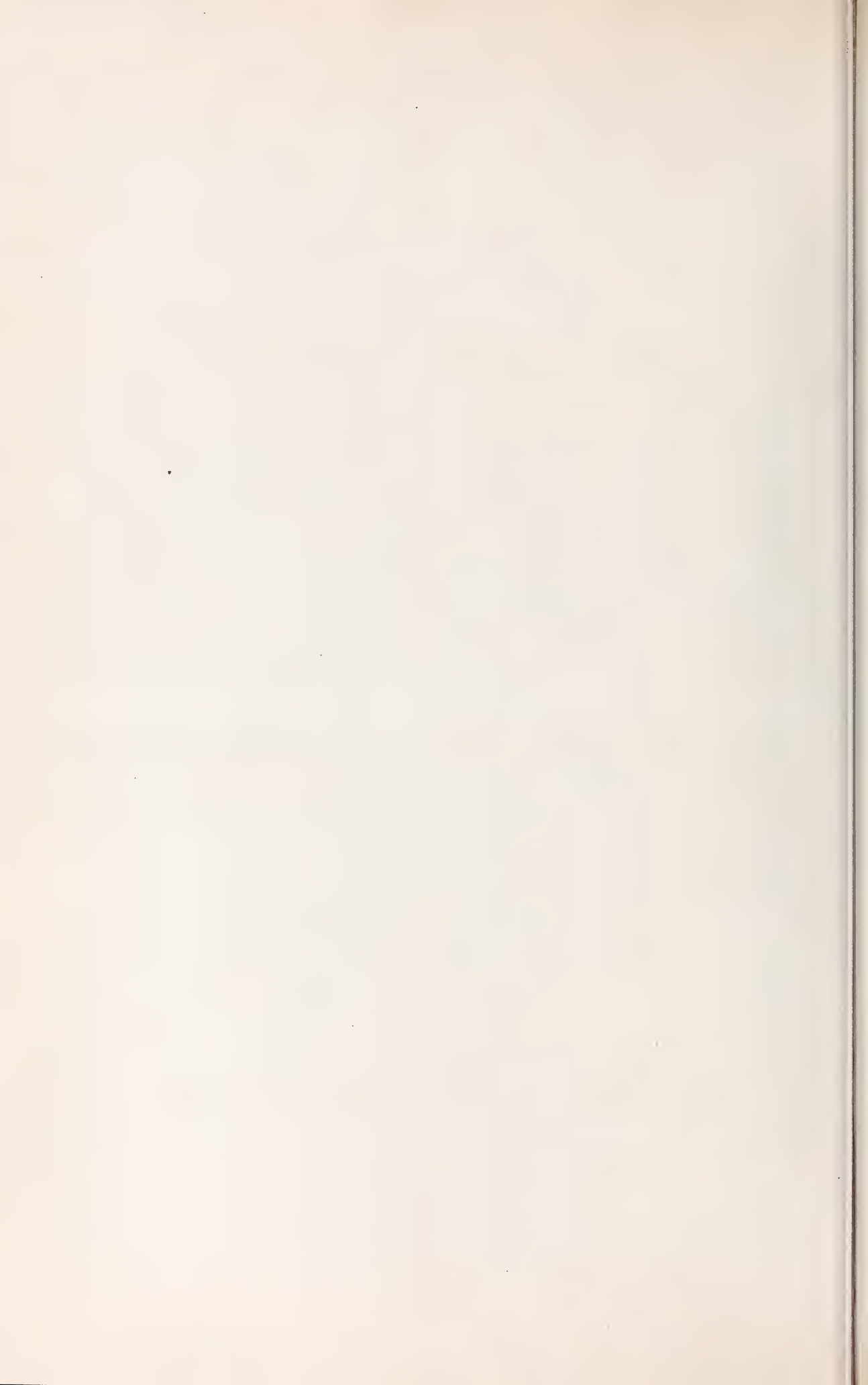
11. In an apparatus of the class described, a movable head portion adapted to close the end of a blank record-cylinder and provided with perforations through such head portion communicating with the inner surface thereof and extending to the outer surface of such record-cylinder, substantially as described.

12. In an apparatus of the class described, a base portion adapted to close one end of a blank record-cylinder to be operated upon and provided with perforations through such base portion communicating with the inner surface thereof and extending to the outer surface of such record-cylinder, substantially as described.

WILLIAM F. MESSER.

Witnesses:

THOMAS E. SHERIDAN,
HARRY IRWIN CROMER.



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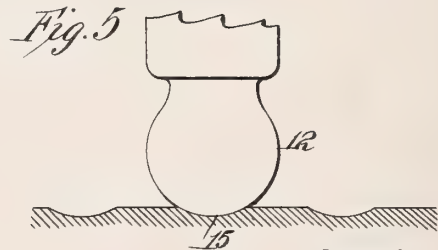
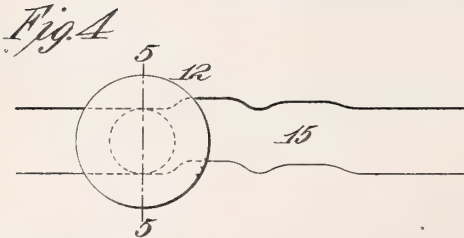
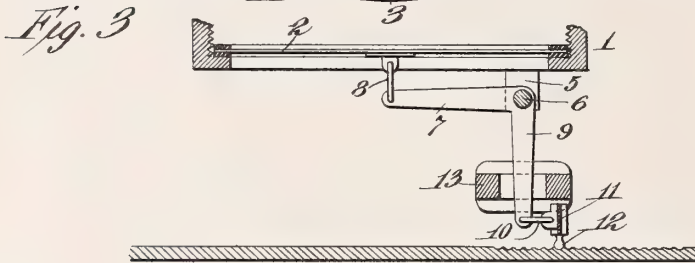
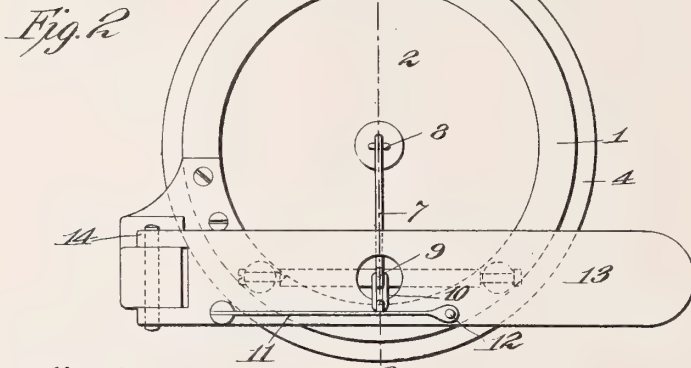
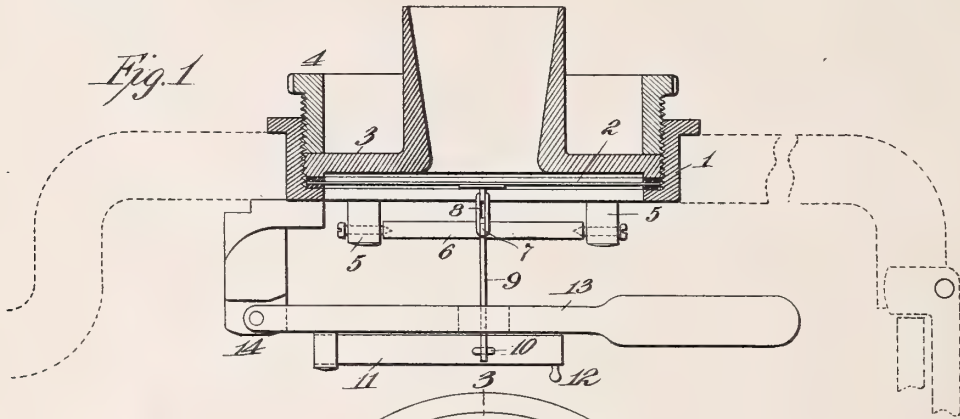
No. 705,829.

Patented July 29, 1902.

T. A. EDISON.
REPRODUCER FOR SOUND RECORDS.

(Application filed Nov. 8, 1901.)

(No Model.)



Witnesses:

Geo. F. Coleman
Wm. Robt Taylor

Inventor

Thomas A Edison
by Ayer Edmund Ayer
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

REPRODUCER FOR SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 705,829, dated July 29, 1902.

Application filed November 8, 1901. Serial No. 81,535. (No model.)

To all whom it may concern:

Be it known that I, THOMAS ALVA EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, Essex county, State of New Jersey, have invented a certain new and useful Improvement in Reproducers for Sound-Records, (Case No. 1,066,) of which the following is a specification.

In an application filed on even date herewith I describe certain improvements relating to apparatus and methods for forming a sinuous sound-record groove of substantially uniform depth and width, the groove presenting transversely the arc of a circle at all portions of its length. My present invention has reference to an improved reproducing device adapted particularly for effecting reproductions from records of this kind or duplicates thereof, but which may be conveniently and effectively employed in connection with sound-records as now made, wherein the record is in the form of a sinuous groove. By making a sinuous sound-record groove of circular cross-section I am enabled to employ a reproducing-stylus which shall have an extended bearing portion, and hence which will be as durable as a phonographic reproducer. This reproducing device may be either spherical in form, or when the sound-record is formed at a low speed or is representative of notes of high pitch or great volume, so that the sinuosities of the groove will be crowded closely together, the reproducer may be of the form which I describe in my reissued Patent No. 11,857, dated September 25, 1900, wherein the longitudinal dimension of the bearing-surface is less than its transverse dimension.

My principal object is to provide an improved reproducer adapted to accurately track all the portions of a sinuous record-groove having curved sides and bottom and which shall have a sufficiently-extended bearing-surface to reduce wear to a minimum.

A further object is to provide details of construction in the connections between the diaphragm and the reproducer for tracking a sinuous record-groove which will improve the efficiency and sensitiveness of the device.

To this end the invention consists, essentially, of a reproducer arranged to vibrate in a plane parallel with the record-surface and which engages a sinuous record-groove of

curved cross-section, said reproducer presenting in its transverse dimension a curve corresponding substantially with that of the record and in its longitudinal dimension a curve of greater or less or of the same diameter. In other words, my improved reproducer for the purpose may be either spherical in form or ellipsoid, with the major axis extending either perpendicular to or parallel with the record-surface. With records taken at a relatively high speed where the sinuosities of the record-groove are relatively extended I prefer to employ a reproducer which is spherical in form; but with low-speed records or ones which are representative of notes of high pitch or large volume, where the sinuosities of the record-groove are crowded closely together, I prefer to employ a reproducer of the special form described in my said reissued patent, wherein the transverse dimension is greater than the longitudinal dimension.

In effecting the secondary objects of my invention I employ a reproducing apparatus wherein the stylus is carried on a spring mounted on a pivoted compensating weight, and which spring is so connected to the diaphragm as to permit the compensating weight to always maintain the stylus in engagement with the record-groove with the desired pressure, irrespective of any mechanical irregularities or eccentricities in the record, whereby the reproducer as a whole may be carried in guides like an ordinary phonographic reproducer instead of imposing its weight on the stylus, as with the reproducing devices for the purpose which have been used before my invention with records of this kind.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical sectional view through the reproducing device, illustrating a spherical stylus; Fig. 2, a bottom plan view of the same; Fig. 3, a transverse section on the line 3 3 of Fig. 2; Fig. 4, a greatly-enlarged detail view showing a portion of a sinuous record-groove with a spherical reproducer engaging the same, illustrating in dotted lines the portion of the reproducer which engages the groove; and Fig. 5, a section on the line 5 5 of Fig. 4.

In all of the above views corresponding parts are represented by the same numerals of reference.

1 is an internally-threaded ring which is carried by a suitable supporting-arm, as shown in dotted lines, and which contains a diaphragm 2, held in place between a pair of elastic gaskets by a disk 3, secured in position by a clamping-ring 4. The horn or listening tubes are connected with the disk 3 in the usual way. Pivoted in bearings 5 on the under side of the ring 1 is a rock-shaft 6, which forms the pivot of a bell-crank lever, the horizontal arm 7 of which is connected by a link 8 to the center of the diaphragm and whose vertical member 9 is connected by a link 10 to a spring 11, carrying the reproducing-stylus 12. The spring 11 is mounted on the compensating weight 13, which at one end is pivoted to a bearing 14, secured to the under side of the ring 1. The pivot between the compensating weight 13 and the bearing 14 permits the compensating weight to move in a vertical plane, to thereby allow the reproducing-stylus to engage the record-groove with the desired pressure irrespective of any mechanical variations or eccentricities therein. These movements of the compensating weight are of course slight, and any variations of the link 10 to either side of its normal horizontal position result only in a minute movement of the spring 11, the tension of which will be increased or reduced to an infinitesimal extent and without affecting the reproduction in any way.

The reproducing-stylus presents a curved bearing-surface which engages the curved groove 15 in the record. As shown, the stylus may be spherical in form, though of less diameter than an ordinary phonographic reproducer, since the record-groove is considerably deeper than the normal depth of a phonographic-record groove. Such a reproducing-stylus offers an extended bearing-surface, (see Fig. 4,) so that wear will be reduced to a minimum. Instead of using a spherical reproducer it will be understood that a reproducer of the type described by me in my said reissue patent may be employed with efficient results when the sinuosities of the record-groove are crowded closely together, or if the record is taken at high speed, so that the curves composing the record are of relatively great diameter, the reproducer may be actually ellipsoidal in form, with the major axis extending parallel with the record-surface and in the line of the record-grooves.

In operation the compensating weight 13 presses the stylus into engagement with the record-groove with a sufficient pressure to permit the groove to vibrate the stylus in a horizontal plane, which vibrations will be communicated to the diaphragm through the bell-crank lever. If the record possesses mechanical imperfections, as is likely to be the case, and the record-groove is not on a true horizontal plane, the compensating weight

will correspondingly rise or fall, but will always keep the stylus in engagement with the bottom of the record-groove. Preferably the connections between the spring 11 and the diaphragm 2 are so proportioned that the spring will be always maintained under slight tension, so that the links 8 and 10 will be always subjected to stress, whereby any lost motion will be avoided and the diaphragm will accurately respond to the vibrations of the stylus.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph, the combination with a sinuous grooved record, of a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, an arm for carrying said stylus and vibrating with respect to a support extending substantially perpendicular to the record-surface, a diaphragm, and connections between said arm and the diaphragm, substantially as set forth.

2. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, and connections between said stylus and diaphragm, substantially as set forth.

3. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, connections between said stylus and diaphragm, and a compensating weight for engaging the stylus with the record and for compensating for mechanical variations or eccentricities in the latter, substantially as set forth.

4. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a stylus presenting a curved extended bearing-surface engaging the record and vibrating in a plane parallel with the record-surface, connections between said stylus and diaphragm, and a compensating weight which carries the stylus for engaging the stylus with the record and for compensating for mechanical variations or eccentricities in the latter, substantially as set forth.

5. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a spring maintained under a normal tension, connections between said spring and diaphragm, and a reproducer carried by the spring for engaging the record and vibrating in a plane parallel to the record-surface, substantially as set forth.

6. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a pivoted compensating weight, a spring carried by said compensating weight and maintained under ten-

sion, connections between said spring and diaphragm, and a reproducer carried by the spring for engaging the record and vibrating in a plane parallel to the record-surface, substantially as set forth.

5 7. In a reproducer for effecting reproductions from a sinuous grooved record, the combination of a diaphragm, a spring maintained under a normal tension, a bell-crank lever between said spring and diaphragm, and a reproducing stylus carried by said spring and vibrating in a plane parallel with the record-surface, substantially as set forth.

8. In a reproducer for effecting reproduc-

tions from a sinuous grooved record, the combination of a diaphragm, a pivoted compensating weight, a spring carried by said weight, a bell-crank lever between said spring and diaphragm, and a stylus carried by said spring and vibrating in a plane parallel with the record-surface, substantially as set forth.

This specification signed and witnessed this 24th day of October, 1901.

THOS. A. EDISON.

Witnesses:

FRANK L. DYER,

JNO. ROBT. TAYLOR.

2011

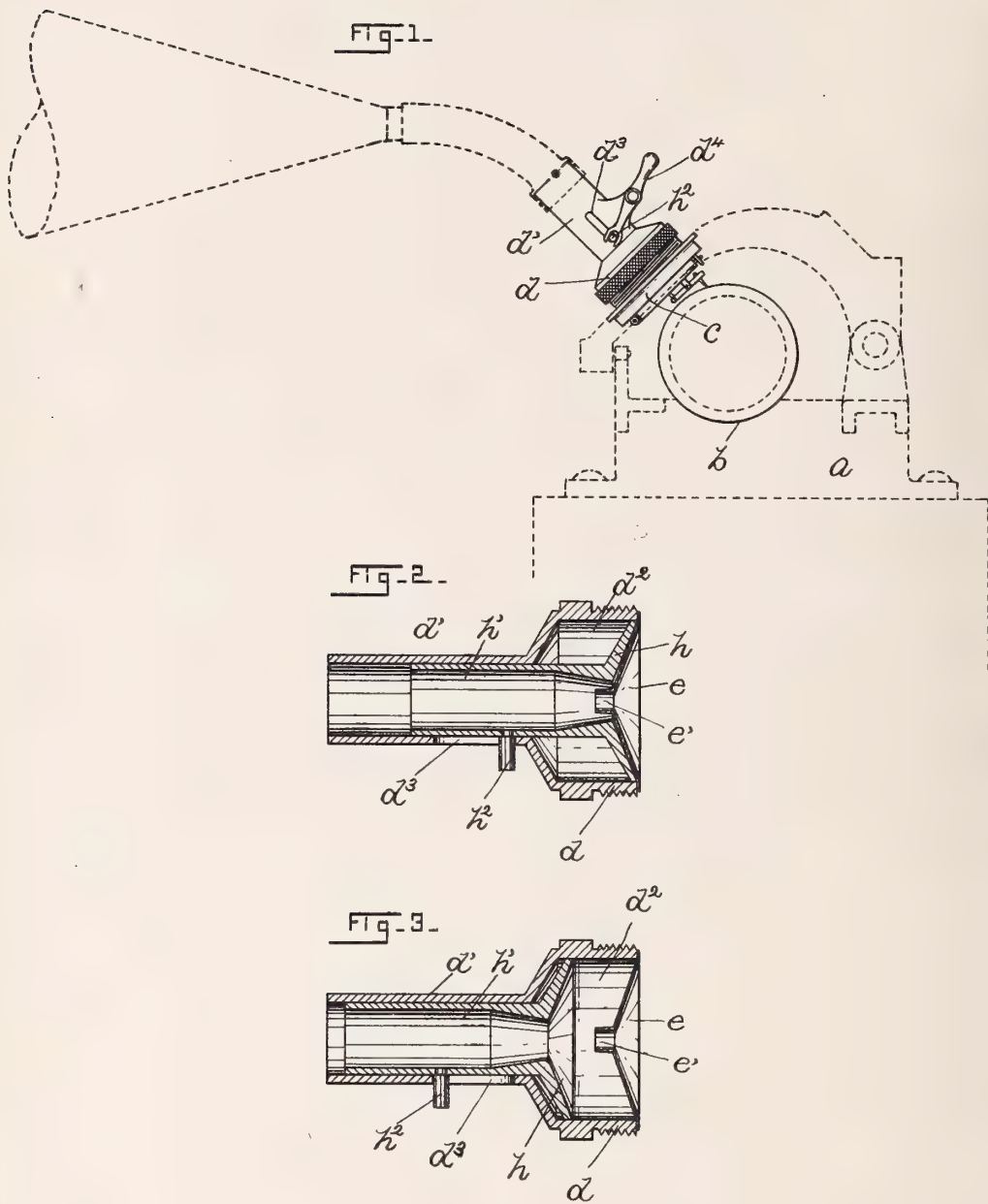
No. 706,627.

Patented Aug. 12, 1902.

M. M. WORTHINGTON.
ATTACHMENT FOR PHONOGRAPHS.

(Application filed Aug. 8, 1901.)

(No Model.)



WITNESSES

Charles M. Luther.
May F. Ritchie.

INVENTOR,

Marcus M. Worthington,
BY *his* ATTORNEY
Frank H. Allen.

UNITED STATES PATENT OFFICE.

MARCUS M. WORTHINGTON, OF NEW LONDON, CONNECTICUT.

ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 706,627, dated August 12, 1902.

Application filed August 8, 1901. Serial No. 71,421. (No model.)

To all whom it may concern:

Be it known that I, MARCUS M. WORTHINGTON, a citizen of the United States, residing at New London, in the county of New London and State of Connecticut, have invented certain new and useful Improvements in Attachments for Phonographs, of which the following is a full, clear, and exact description.

The immediate purpose of this invention is to provide an exceedingly simple and cheap attachment for phonographs by means of which the character of musical or articulated tones may be reproduced substantially as in the original. For example, the metallic tones of a brass instrument may be naturally reproduced, and by a slight adjustment of my present attachment the same phonograph may be caused to deliver articulated tones so modified as to faithfully represent the human voice, the objectionable and usual brassy tones of the instrument being entirely eliminated.

My said invention consists, essentially, of a chamber interposed between the speaking attachment of the phonograph and the trumpet, and includes also means for enlarging and diminishing the said chamber, the adjusting means being so arranged that the said chamber may be enlarged, diminished, or entirely cut out while the phonograph is in operation.

In carrying my invention into effect I preferably utilize the top plate and collar as now commonly provided to support the so-called "speaker," as by so doing I am able to adapt my present invention to phonographs of ordinary construction with very slight and inexpensive modifications of such phonographs.

In connection with this specification I have provided the accompanying sheet of drawings, in which—

Figure 1 is a side elevation, chiefly in dotted outline, of a phonograph, showing also in full lines in proper relation to said phonograph the speaker and my improvement attached thereto. Fig. 2 is an enlarged longitudinal central sectional view of the collar and top plate with my attachment embodied therein, the chamber, which forms the chief feature of my invention, being closed. Fig. 3 is a view similar to Fig. 2, showing the said chamber opened to its greatest extent.

In the drawings, *a* indicates generally the phonograph, and *b* a cylindrical record.

c indicates the speaker or reproducer, and *d* the collar onto which the speaker is screwed, said collar being formed with a tubular extension *d'* of reduced diameter, over which is drawn the usual flexible tube that connects the extension *d'* with the trumpet. Located in the open end of the collar *d* is a cone-shaped dome *e*, having its central portion—that is to say, the apex of the cone—drawn out to form a tubular opening *e'*.

The width of the collar *d* is such that a chamber *d²* of considerable length is provided, in which is located a disk *h*, having a tubular stem *h'*, that is telescoped into the tube *d'* and is adapted to slide freely therein.

When the disk is moved forward into the position shown in Fig. 2, the tubular extension *d'* lies within the central opening in the disk *h*, and said disk then abuts the dome *e*, thus closing the chamber *d²*, or rather cutting the said chamber off from communication with the opening in the tube *h'*. When the parts are thus adjusted, the sounds emitted by the speaking-reproducer pass unobstructedly through the tube *h'* and thence pass outward through the conduit formed by the flexible tube to the trumpet in the manner now usual in phonographs of this class. When, however, it is desired to modify and change the tones of the speaker, the tube *h'* may be slid within the outer tube *d'*, so as to move the disk *h* away from the dome *e*, as in Fig. 3, thus causing the sound waves to be discharged through tube *e'* into the enlarged chamber *d²*, which chamber serves (as I find in practice) to soften and modify the otherwise harsh, rasping, and metallic tones of the instrument. By adjusting the disk *h* so as to enlarge or reduce the capacity of the chamber *d²* I find in practice that any desired qualification of tone may be produced from the natural brassy tone of the phonograph to a pleasing, subdued, and softened tone, this result being specially notable and desirable when articulated sounds are being reproduced.

In order to adjust the inner tube *h'* and its disk *h* so as to regulate the size of chamber *d²* or to completely cut off said chamber from

the sound-waves, I preferably provide the following-named mechanism:

The outer tube d' is slotted, as at d^3 , and the inner tube h' is provided with a stud h^2 , that projects outward through said slot. Fulcrumed on tube d' is a lever d^4 , one of whose ends is forked and straddles the projecting stud, as seen in Fig. 1. By rocking the said lever on its fulcrum the stud h^2 is caused to move in slot d^3 , and the connected inner tube h' is simultaneously moved lengthwise within the outer tube. This adjustment of the inner tube and disk h to vary the capacity of chamber d^2 may be performed while the phonograph is in use.

It will be obvious that my described means for controlling and modifying the tones of phonographs may be used with good effect with recorders during the operation of making new records; but it is particularly valuable for correcting the objectionable and disagreeable tones of records as now made and sold.

Having thus described my invention, I claim—

1. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means within said chamber for varying the size thereof, substantially as described.

2. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means within the chamber and operable from the exterior thereof for varying its size, substantially as described.

3. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means

within said chamber independent of the diaphragm for varying its size, substantially as described.

4. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, a longitudinally-movable abutment in said chamber of substantially the same size as the internal diameter thereof, and means for moving said abutment to vary the size of the chamber, substantially as described.

5. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means within said chamber for establishing or eliminating communication between the same and the trumpet, substantially as described.

6. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means within the chamber for establishing or eliminating communication between the same and the trumpet while the machine is in operation, substantially as described.

7. In a phonograph, a sound - modifying chamber adapted to be interposed between the diaphragm and the trumpet, and means within and operable from the exterior of the chamber for establishing or eliminating communication between the same and the trumpet, substantially as described.

Signed at Norwich, Connecticut, this 23d day of July, 1901.

MARCUS M. WORTHINGTON.

Witnesses:

FRANK H. ALLEN,
MAY F. RITCHIE.

207, 224

No. 707,204.

Patented Aug. 19, 1902.

H. V. BUTTERWORTH.
RECORDER FOR PHONOGRAPHS, &c.
(Application filed Mar. 25, 1901.)

(No Model.)

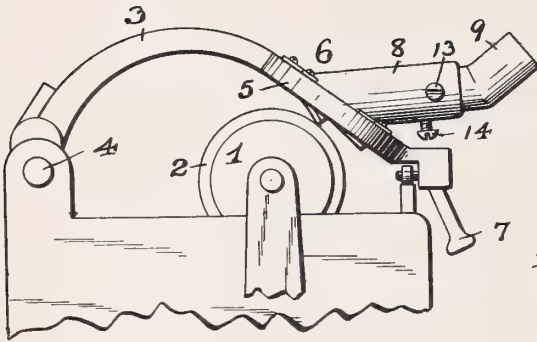


FIG. 1

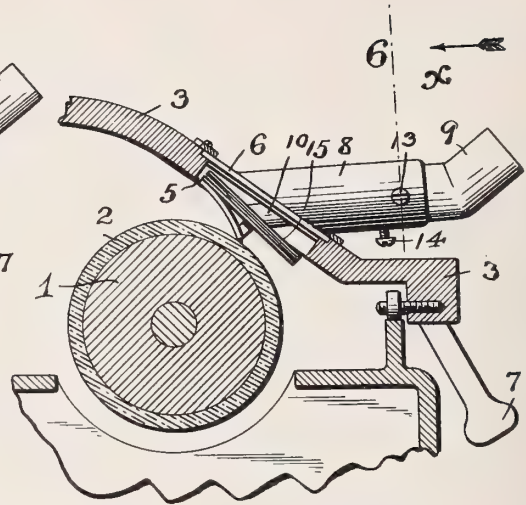


FIG. 2

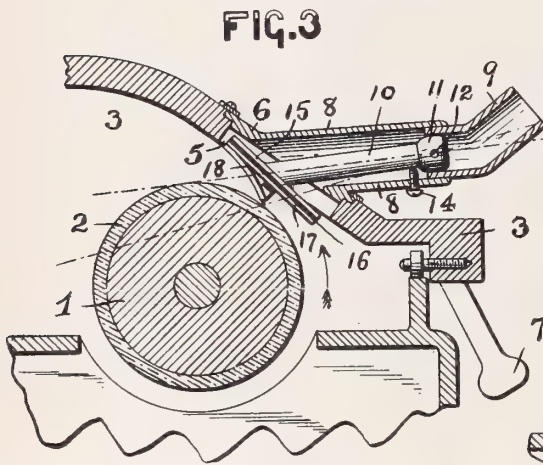


FIG. 3

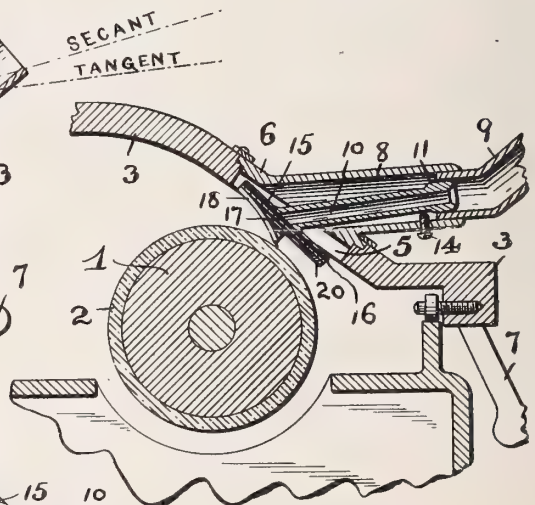


FIG. 4

FIG. 5

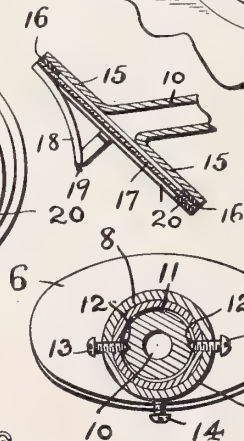
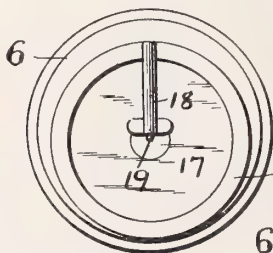
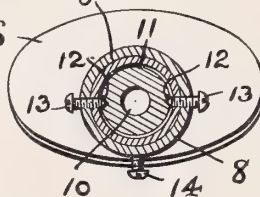


FIG. 5 A

FIG. 6



WITNESSES:
Geo. S. Richards
Joe Salmon

INVENTOR:
HUBERT V. BUTTERWORTH,
BY
Fred C. Fraentzel
ATTORNEY

UNITED STATES PATENT OFFICE.

HUBERT V. BUTTERWORTH, OF NEWARK, NEW JERSEY.

RECORDER FOR PHONOGRAPHS, &c.

SPECIFICATION forming part of Letters Patent No. 707,204, dated August 19, 1902.

Application filed March 25, 1901. Serial No. 52,695. (No model.)

To all whom it may concern:

Be it known that I, HUBERT V. BUTTERWORTH, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Recorders for Phonographs or the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

15 This invention relates generally to improvements in recorders for phonographs, and more particularly to a novel arrangement, construction, and means of supporting a recorder upon a phonograph-arm with a view of providing a better construction of recorder and producing better phonographic records than heretofore.

The principal object of this invention, therefore, is to arrange, with a record-receiving cylinder and the frame in which the recorder is placed, a recording attachment comprising a tube-plate connected with a tubular member of said tube-plate, a second tubular member pivotally connected with the tubular member of said tube-plate provided at its free end with a recording-diaphragm, and a stylus, all arranged in such a manner that an imaginary line drawn through the axis of the pivotal support of the recorder-carrying arm or support and the point of contact of the stylus or sapphire with the record-receiving surface of the record cylinder or roll will be a secant instead of a tangent, as heretofore, the purpose being to decidedly prevent rebounding of the stylus or sapphire due to the vibrations of the recording disk or diaphragm in making records, and thereby producing a more defined and a clearer record.

Other objects of this invention not at this time specifically mentioned will be fully understood from the accompanying specification of my present invention.

The invention consists in the novel recorder for phonographs hereinafter set forth and in the novel arrangements and combinations of parts, as well as in the details of the construction thereof, all of which will be more fully

described in the following specification and then finally embodied in the clauses of the claim which form a part of this specification. 55

The invention is fully illustrated in the accompanying drawings, in which—

Figure 1 is a side view of a portion of a phonograph, a record-cylinder, means for retaining the tube-plate, to which the horn is to be attached, in position, and illustrating in connection therewith the recorder embodying the principles of my invention. Fig. 2 is a vertical section of a portion of the frame of a phonograph, the record-receiving roll or platen, and the cylinder, said view also illustrating in section the arm for receiving and retaining the tube-plate in position, the said tube-plate and the recording-disk and parts thereof being represented in side elevation. 60 Fig. 3 is a vertical representation of the several parts illustrated in said Fig. 2, except the recording-disk and tube with which it is connected, both said last-mentioned parts being shown in side elevation. Fig. 4 is a vertical section of all of the said parts represented in said Figs. 2 and 3. Fig. 5 is a face view of the recorder. Fig. 5^A is a vertical cross-section, on an enlarged scale, of a portion of the recorder embodying the principles 65 of my invention; and Fig. 6 is a vertical cross-section taken on line 6 6 in Fig. 2 looking in the direction of the arrow *x* in said Fig. 2.

Similar numerals of reference are employed in all of the said above-described views to 75 indicate corresponding parts.

In the said drawings, 1 indicates the usual construction of metal cylinder, upon which is placed in the usual manner the wax cylinder or platen 2 for receiving the record. As illustrated in Fig. 1, 3 indicates the usual form of arm, pivoted, as at 4, upon the frame of the phonograph, the said arm being provided with the usual bearing 5 for the reception of the tube-plate 6. The said arm 3 is also provided 80 with the lifting-lever 7. The tube-plate 6 is detachably secured in the bearing 5 in the ordinary and well-known manner and is provided with the forwardly-extending tubular member 8 and tubular elbow 9 for the reception of an ordinary sound-receiving horn. 100

The device for recording the vibrations caused by the voice or other sound-producing medium consists, essentially, of a tube 10,

provided at its one end with a spherical or ball-shaped enlargement or end 11, which is formed in its opposite sides with suitable depressions or recesses 12, into which extend the pointed ends of a pair of pivots or screws 13, substantially as illustrated in Fig. 6. The main body of said tube 10 extends in a direction within the tubular member 8 of the tube-plate 6 toward the peripheral surface of the record-cylinder, and said tube 10 rests, preferably, upon an adjusting and supporting screw 14 as illustrated. The said tube 10, which is provided with the recording diaphragm or disk in the manner to be presently described, is thus capable of an oscillatory motion within the tubular member 8 of the tube-plate 6 and can be regulated by means of the said adjusting or supporting screw 14 for bringing the stylus or sapphire of the vibratory diaphragm in the proper position for producing the best and most efficient impressions or indentations in the wax cylinder or platen 2 when providing said cylinder with a record.

The arrangement and manner of securing the diaphragm and stylus in their operative positions upon the disk or plate 15 of the tube 10 are represented more particularly in Figs. 5 and 5^A of the drawings. The said disk or plate 15, which is of a circular configuration in outline, has suitably secured upon its face toward the wax cylinder 2 and at the marginal edge thereof a suitable soft-rubber gasket or ring 16, upon which is placed and secured the diaphragm 17, provided with the usual arm 18 and stylus or sapphire 19. A second soft-rubber gasket or ring 20 is then arranged upon the face of the diaphragm 17 at or near its marginal edge, the said gaskets or rings, the diaphragm, and the plate 15 all being suitably secured in their fixed relations by means of a cement, as will be understood. By this arrangement and construction of the parts the thin diaphragm is capable of stronger or more positive vibrations, and the gasket or ring 20 serves as a protection to the diaphragm-glass in that said ring acts as a frame, which surrounds the marginal edge of the diaphragm, and thereby prevents the latter from becoming broken or damaged.

The utility and efficiency of a recorder for producing phonographic records made on the principles of my hereinabove-described invention will be clearly evident, and the stylus or sapphire being made to engage the record-cylinder at a point outside of the tangential plane passing through the point of contact of the stylus with the cylindrical surface of the record-cylinder, as heretofore, all possible rebounding of the stylus or sapphire caused by the vibrations of the diaphragm from the said cylindrical surface of the record-cylinder during the time of receiving a record is clearly overcome. The liability of spoiling a record is thereby fully avoided, and owing to the angle of contact between the point of

the stylus or sapphire and the cylindrical surface of the record roll or cylinder a deeper and better indentation is produced in the surface of the said cylinder, and when the same is placed in a phonograph for reproduction of the record the sounds are reproduced with positive clearness and are loud and distinct, so as to be fully understood.

I am aware that some changes may be made in the arrangements and combinations of the parts without departing from the scope of my present invention. Hence I do not limit this invention to the exact arrangements and combinations of the parts nor do I confine myself to the details of the construction of said parts.

Having thus described my invention, what I claim is—

1. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment pivotally arranged and secured within said tubular member, having its recording-diaphragm extending beyond said tube-plate, and an adjusting-screw in the tubular member of said tube-plate in engagement with a portion of said pivotally-arranged recording attachment for the angular adjustment of the diaphragm of said recording attachment, relative to the surface of the phonograph-cylinder, substantially as and for the purposes set forth.

2. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment arranged and secured within said tubular member, having its recording-diaphragm extending beyond said tube-plate, and an adjusting-screw 14 arranged in said tubular member and in supporting engagement with a portion of said recording attachment for the angular adjustment of the recording-diaphragm relative to the surface of the phonograph-cylinder, substantially as and for the purposes set forth.

3. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment arranged and secured within said tubular member, having its recording-diaphragm extending beyond said tube-plate, and an adjusting-screw in said tubular member having its point in supporting engagement with a portion of said recording attachment, substantially as and for the purposes set forth.

4. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment within said tubular member, having its recording-diaphragm extending beyond said tube-plate, and means connected with and within the said tubular member for securing said recording attachment in oscillatory relation within said tubular member, substantially as and for the purposes set forth.

5. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment

within said tubular member, having its recording-diaphragm extending beyond said tube-plate, and means connected with and within the said tubular member for securing
 5 said recording attachment in oscillatory relation within said tubular member, consisting, of a pair of pivots arranged in the opposite sides of said tubular member, and having their inner ends in pivotal supporting engage-
 10 ment with said recording attachment, substantially as and for the purposes set forth.

6. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment
 15 within said tubular member, having its recording-diaphragm extending beyond said tube-plate, means connected with said tubular member for securing said recording attachment in oscillatory relation within said
 20 tubular member, and an adjusting-screw in said tubular member, having its point in supporting engagement with a portion of said recording attachment, substantially as and for the purposes set forth.

7. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment within said tubular member, having its recording-diaphragm extending beyond said
 30 tube-plate, means connected with said tubular member for securing said recording attachment in oscillatory relation within said tubular member, consisting, of a pair of pivots arranged in the opposite sides of said tubular member, and having their inner ends in pivotal supporting engagement with said
 35 recording attachment, and an adjusting-screw in said tubular member, having its point in supporting engagement with a portion of said recording attachment, substantially as and for the purposes set forth.

8. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment,
 45 consisting, of a tube 10, having a ball-shaped end, arranged within said tubular member, and means in said tubular member and in engagement with said ball-shaped end for the

oscillatory arrangement of said tube 10 within said tubular member, and a recording-dia- 50
 phragm on the opposite end of said tube 10, substantially as and for the purposes set forth.

9. In a recorder for phonographs or the like, the combination, with a tube-plate and its tubular member, of a recording attachment, 55
 consisting, of a tube 10, having a ball-shaped end, arranged within said tubular member, means in said tubular member in engagement with said ball-shaped end for the oscillatory arrangement of said tube 10 within said tu- 60
 bular member, a recording-diaphragm on the opposite end of said tube 10, and an adjusting-screw in said tubular member, having its point in supporting engagement with a por-
 65 tion of said tube 10, substantially as and for the purposes set forth.

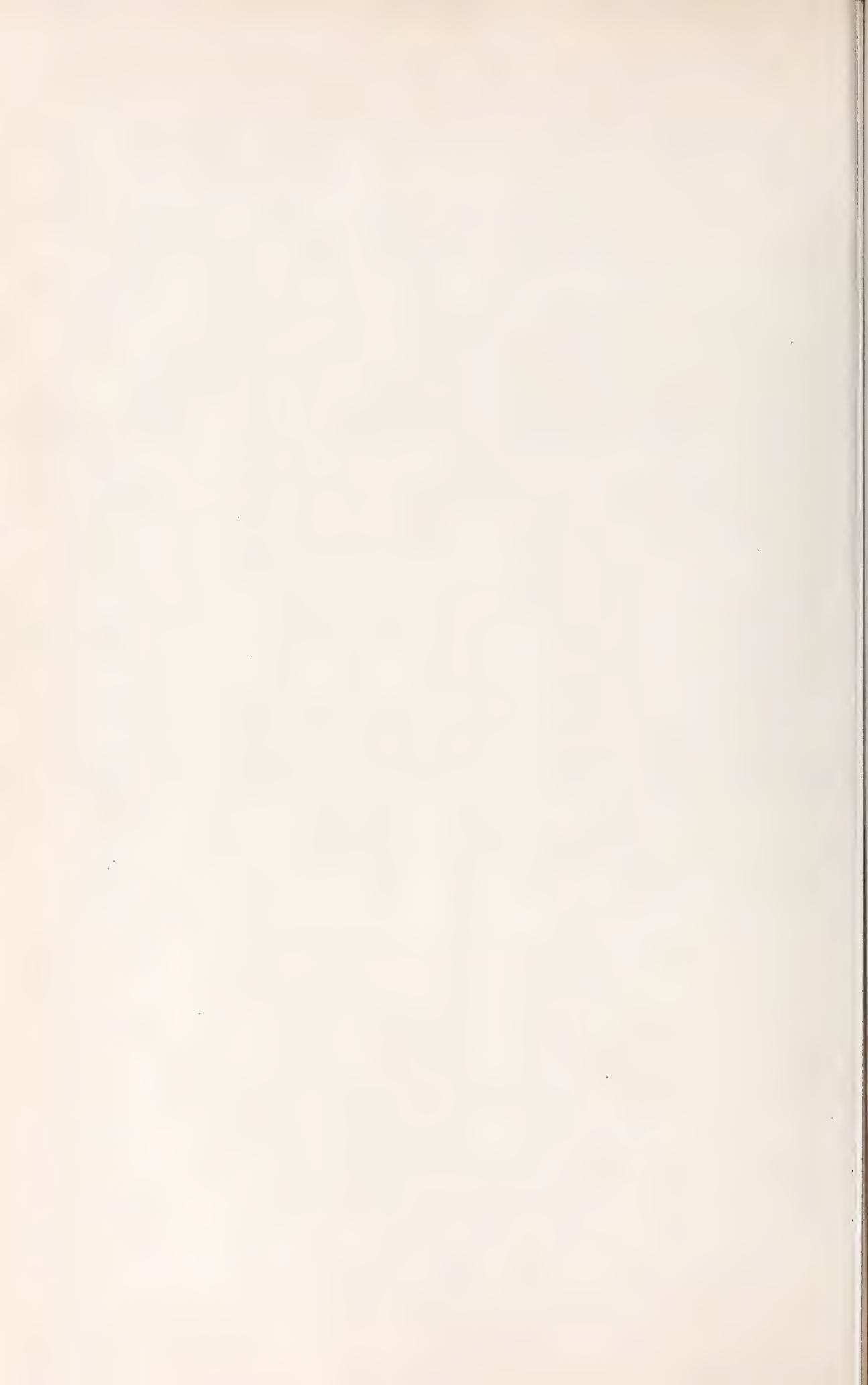
10. In a phonograph, the combination, with a record-receiving cylinder and the frame in which the recorder is arranged, of a recording attachment comprising a tube-plate se- 70
 cured to said frame, a tubular member connected with said tube-plate, a second tubular member pivotally connected with the tubular member of said tube-plate, said second tubular member having its opposite end ex- 75
 tending beyond the said tube-plate, a recording-diaphragm on the free end of said second tubular member, and a stylus on said record-
 80 ing-diaphragm, the said stylus, the recording-diaphragm and said second tubular member, all being arranged in such relation to the cylindrical surface of the record-receiving cylinder, that an imaginary plane through the point of pivotal support of said second tubular member and the point of contact of 85
 the stylus with the cylindrical surface of the recording-cylinder will produce a secant with the recording-cylinder, substantially as and for the purposes set forth.

In testimony that I claim the invention set 90
 forth above I have hereunto set my hand this 20th day of March, 1901.

HUBERT V. BUTTERWORTH.

Witnesses:

FREDK. C. FRAENTZEL,
 GEO. D. RICHARDS.



107.749

No. 707,749.

Patented Aug. 26, 1902.

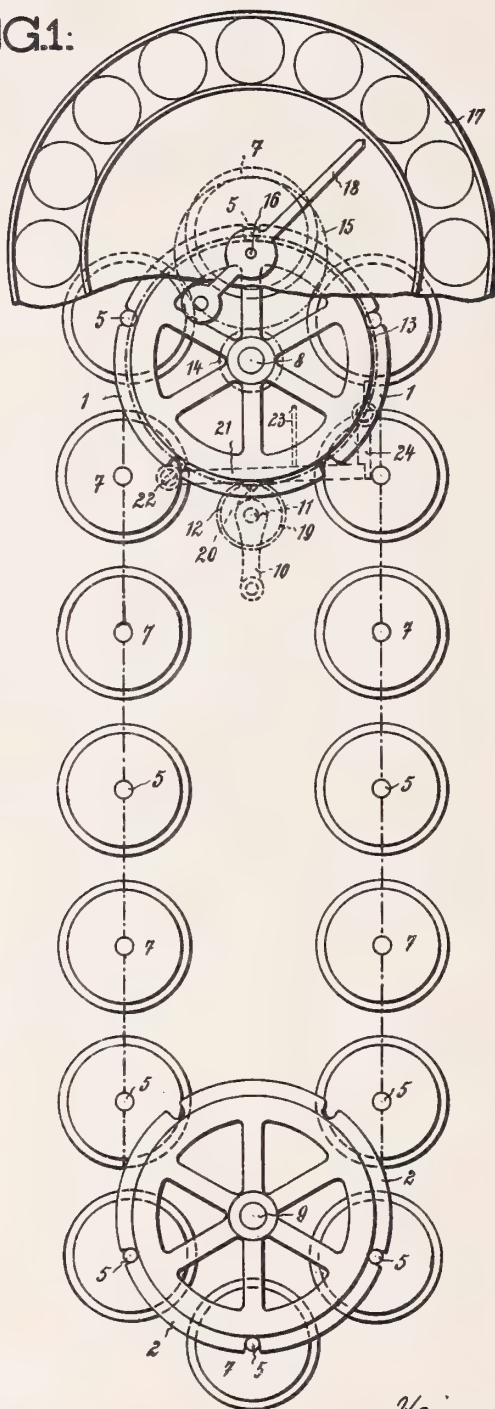
H. WINKELMANN.
PHONOGRAPH.

(Application filed Nov. 19, 1901.)

(No Model.)

2 Sheets—Sheet 1.

FIG.1:



Witnesses:

Edward Ray
William Schuly

Inventor:
Heinrich Winkelmann
by his attorneys
Roeder & Brienen



No. 707,749.

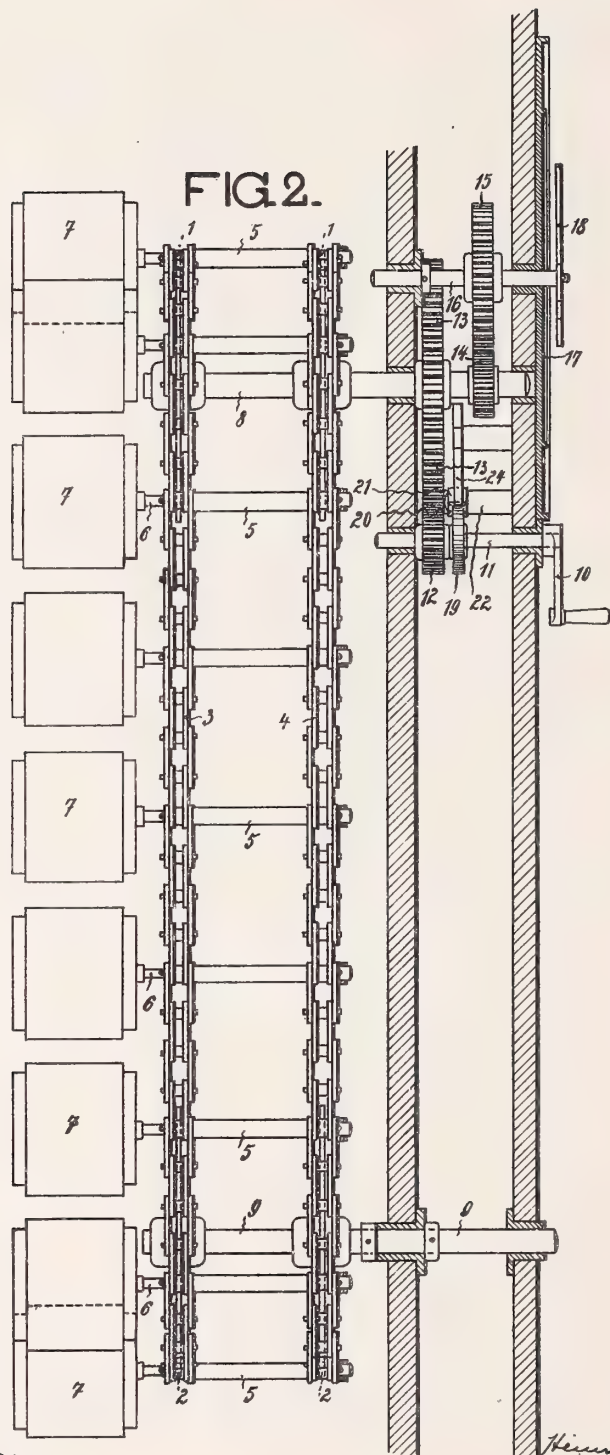
Patented Aug. 26, 1902.

H. WINKELMANN.
PHONOGRAPH.

(Application filed Nov. 19, 1901.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:
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William Schuly

Inventor:
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by his attorneys
Roeder & Bensen

UNITED STATES PATENT OFFICE.

HEINRICH WINKELMANN, OF BREMEN, GERMANY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 707,749, dated August 26, 1902.

Application filed November 19, 1901. Serial No. 82,938. (No model.)

To all whom it may concern:

Be it known that I, HEINRICH WINKELMANN, a citizen of the Hanse town of Bremen, residing at 51 Knochenhauerstrasse, Bremen, in the Empire of Germany, have invented new and useful Improvements in and Relating to Phonographs, of which the following is a specification.

This invention relates to an improved phonograph, and more particularly to improved means for mounting the record-cylinders, so that they may be readily brought into their operative position and interchanged.

In the accompanying drawings I have shown by way of example a constructional form of the apparatus forming the subject of my said invention.

Figure 1 is a side elevation of the same; and Fig. 2, a front elevation, partly in section.

The two endless chains 3 and 4, running parallel to each other, are guided over pairs of wheels 1 and 2, each pair of these wheels being arranged upon a shaft 8 or 9, firmly held in the casing of the phonograph. The journals 6, on which the cylinders 7 are slid, form one-sided prolongations of bolts 5, connecting the chains, and which, in lieu of the ordinary joint-bolts, are placed at distances apart corresponding to the thickness of the cylinders.

For moving the cylinders into their operative position, use is made, for instance, of a crank 10, provided on the outside of the casing and arranged at the end of a shaft 11, by which the turning movement is transmitted through toothed wheels 12 13 to the chain-wheel shaft 8. In the constructional example shown it is supposed that one revolution of the crank corresponds to the distance between the centers of two neighboring cylinders 7, so that at every revolution of the crank the following cylinder will be conveyed into the operative position. From the shaft 8 the rotary movement is transmitted through toothed wheels 14 15 to shaft 16. An index 18, carried by this shaft, moves outside in front of a dial 17, upon which the numbers of the cylinders and the records on such cylinders are indicated. The wheels are of such sizes that one revolution of the index 18 corresponds to a complete turn of the chains 3 4. Of course the cylinders are held by the chains in the same order as the titles of the records on the dial 17, and both arrangements corre-

spond to each other, so that when the index points to a certain title the cylinder placed in the operative position bears the record indicated thereby.

In Fig. 1 is shown a stopping device designed to prevent the turning movement of the crank 10 on the running-gear of the phonograph being disengaged. Upon the crank-shaft 11 is arranged a stop-disk 19, having in its periphery a notch with which in the position of rest of the crank, Fig. 1, the corresponding projection 20 on a one-armed lever 21 engages. This lever swings about a journal 22, and in the raised position, as soon as its projection 20 bears upon the periphery of the disk 19, when the crank 10 is turned arrests the running-gear of the phonograph by an arm 23. When the projection 20 engages with the notch in the disk 19, the lever 21 is stopped by a pawl 24 falling over its free end, and which on the insertion of a coin is disengaged before the running-gear of the phonograph.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A phonograph provided with a pair of endless chains, a series of connecting-bolts extending with one end laterally beyond the chains, and with cylinders mounted upon such laterally-projecting bolt ends, substantially as specified.

2. A phonograph provided with a pair of endless chains, a series of connecting-bolts extending with one end laterally beyond the chains, cylinders mounted upon the laterally-projecting bolt ends, a crank-shaft for rotating the chains, and an index intergeared with the crank-shaft, substantially as specified.

3. A phonograph provided with a pair of endless chains, a series of connecting-bolts extending with one end laterally beyond the chains, cylinders mounted upon the laterally-projecting bolt ends, a crank-shaft for rotating the chains, a notched disk mounted upon said shaft, a lever having a projection adapted to engage the disk, and an arm on the lever adapted to arrest the running-gear of the phonograph, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HEINRICH WINKELMANN.

Witnesses:

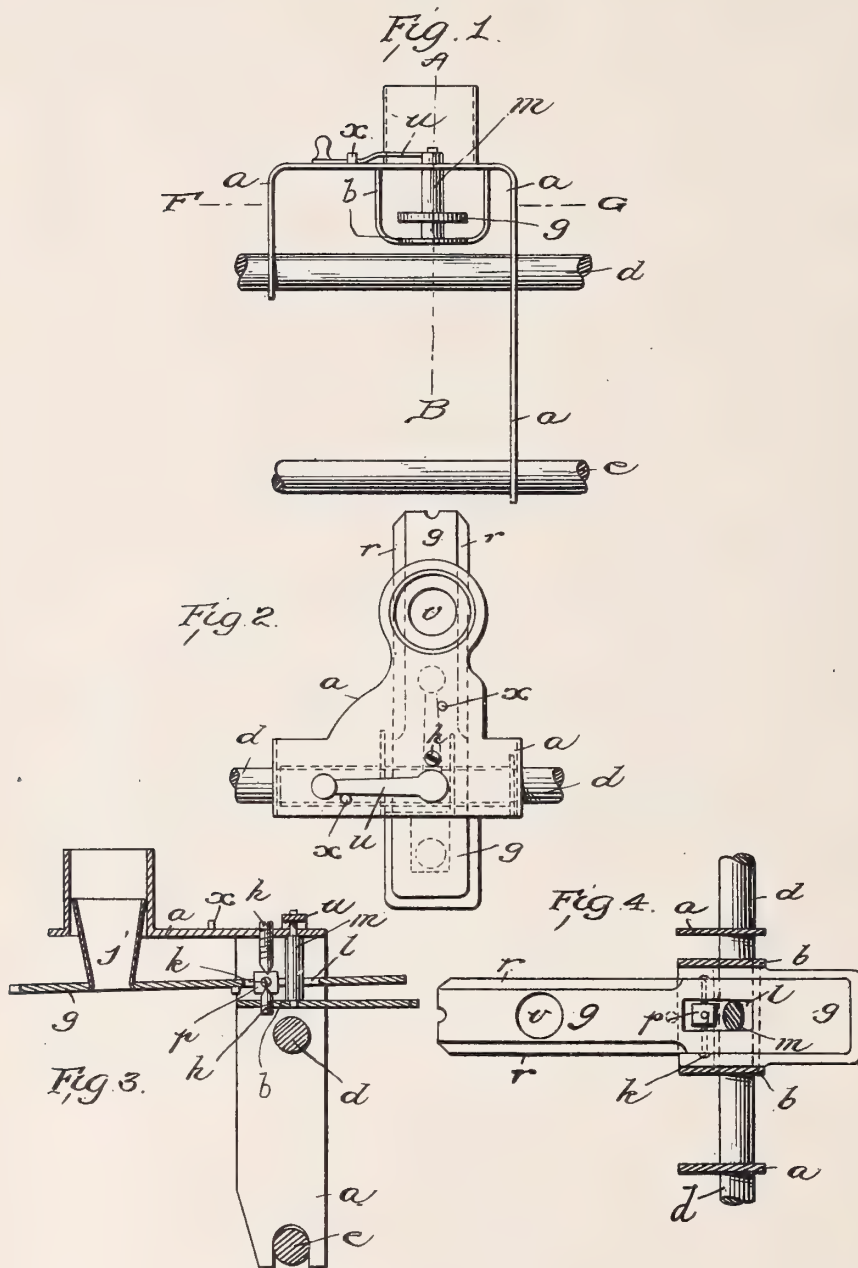
F. A. BRYCE,
S. HOYERMANN.



W. PEISKER.
PHONOGRAPH.

(Application filed Jan. 9, 1901.)

(No Model.)



Witnesses
Walter Donaldson
C. M. Alator

Inventor
Wilhelm Peisker
by *Richard*
Attorneys

UNITED STATES PATENT OFFICE.

WILHELM PEISKER, OF BERLIN, GERMANY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 708,581, dated September 9, 1902.

Application filed January 9, 1901. Serial No. 42,620. (No model.)

To all whom it may concern:

Be it known that I, WILHELM PEISKER, residing at Berlin, Germany, have invented Improvements Relating to Phonographs, of which the following is a specification.

The present invention refers to a diaphragm-holder for holding and for guiding diaphragms in phonographs. As will be known, there are two kinds of said diaphragms—recording-diaphragms and reproducing-diaphragms. The recording-diaphragm marks into the surface of the record-cylinder a regular spiral line and must, therefore, be prevented from making any lateral movements. The reproducing-diaphragm follows the spiral line marked down by the recording-diaphragm. As any lateral pressure or any mechanical influences might cause the reproducing-diaphragm to be lifted off of the spiral line, said reproducing-diaphragm must be allowed to have free lateral play. Now the reproducing-diaphragm must move freely and unobstructedly, while the recording-diaphragm has to be held firmly in its position. Consequently the apparatus described hereinafter is arranged in such a manner that the diaphragm which happens to be in use is held according to the purpose which it has—that is to say, reproducing-diaphragms are held in a loose position and, on the other hand, recording-diaphragms are held in a secured position.

In the accompanying drawings, Figure 1 is a front view of the invention with parts omitted. Fig. 2 is a plan view. Fig. 3 is a sectional view on line A B of Fig. 1. Fig. 4 is a plan view, partly in section.

In the drawings I have shown only enough of the ordinary apparatus as is necessary to a complete understanding of my invention.

In Fig. 1, *a* is the instrument-frame of a phonograph arranged in the usual manner on two guide-bars *d* and *e*, so that it can be moved.

The instrument-frame has the form of a bent frame supported within a bridge *b*. The bridge *b* and the instrument-frame *a* consti-

tute one combined part and support, by means of two pointed screws *h h*, Figs. 2 and 3, a block *p*. Said block *p* is provided with an axle or pivot *k*, upon which a flat rod *g* is supported, so that it can be moved vertically. Said rod or plate *g* can move horizontally, because the block *p*, carrying it, can swing on the pivots *k*. The plate *g* serves for holding in place the diaphragms. In order to limit the movements of the arm or plate and to allow it at times more play, a slot *l* is provided in said arm or plate *g*, through which a cam-rod *m* extends. Said rod is elliptical in cross-section and when turned, as shown in Fig. 4, it prevents lateral movement of the plate, while allowing free vertical movement. However, if the cam or locking rod *m* is given a quarter-turn then arm or plate *g* can have free lateral movement with the diaphragm. To insure the easy and convenient turning of the locking-rod *m*, it is provided with an arm *u*. Two stops *x x*, arranged on the frame *a*, serve to limit the movement of the arm, so that the locking-rod *m* can be brought speedily and without difficulty into the recording or into the reproducing position.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination, a pivoted arm for supporting the diaphragm, having a slot, and a revoluble locking-rod passing through said slot and flattened on its side, said rod being arranged to limit the lateral movement of the pivoted arm, substantially as described.

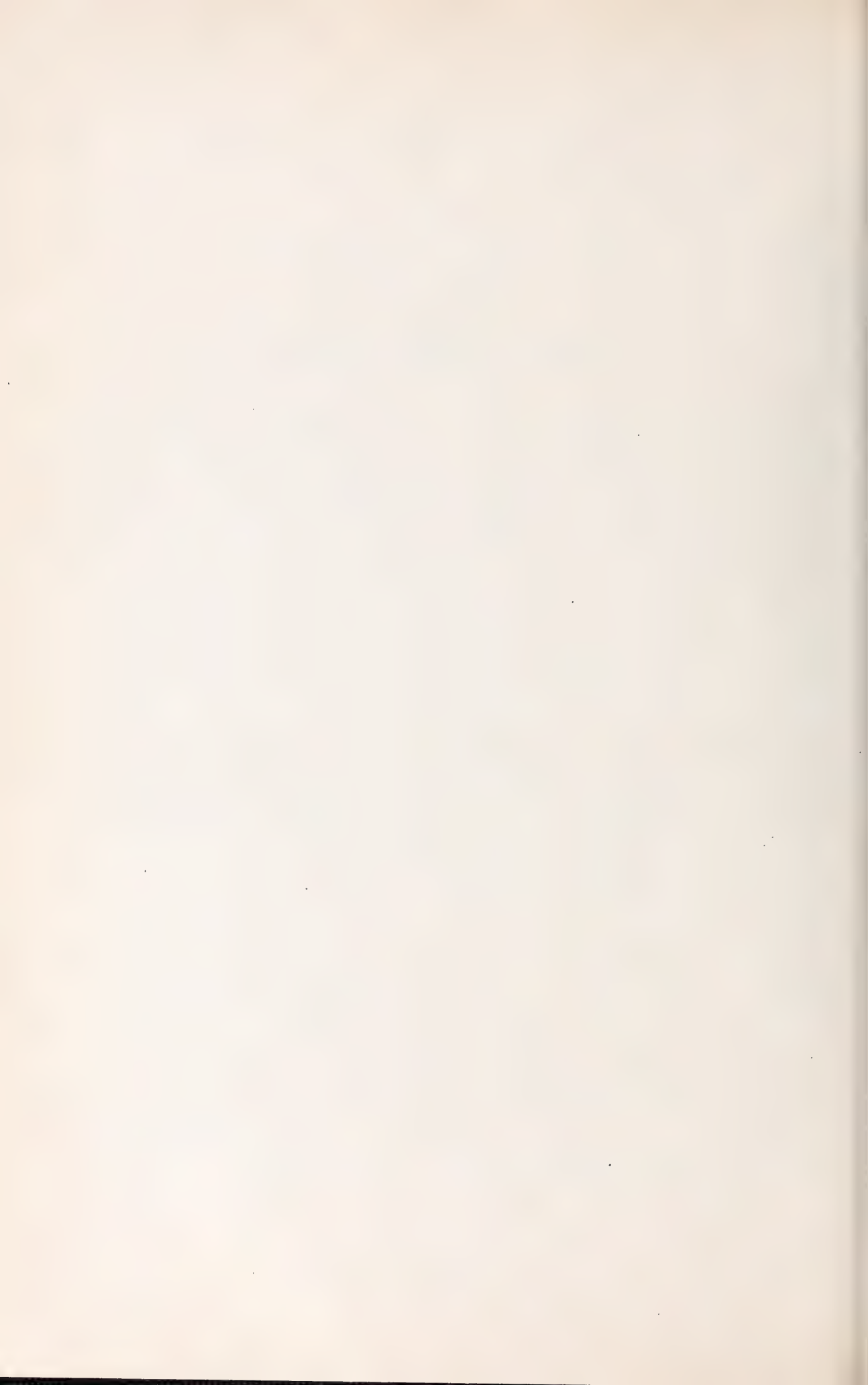
2. A holding device for recording and speaking apparatus in phonographs comprising an arm *g*, and a locking-rod *m* on which the arm is guided, said rod being flattened laterally, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILHELM PEISKER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.



No. 708,810.

Patented Sept. 9, 1902.

E. A. HEYL.

HORN FOR TALKING MACHINES.

(Application filed July 11, 1900. Renewed Aug. 4, 1902.)

(No Model.)

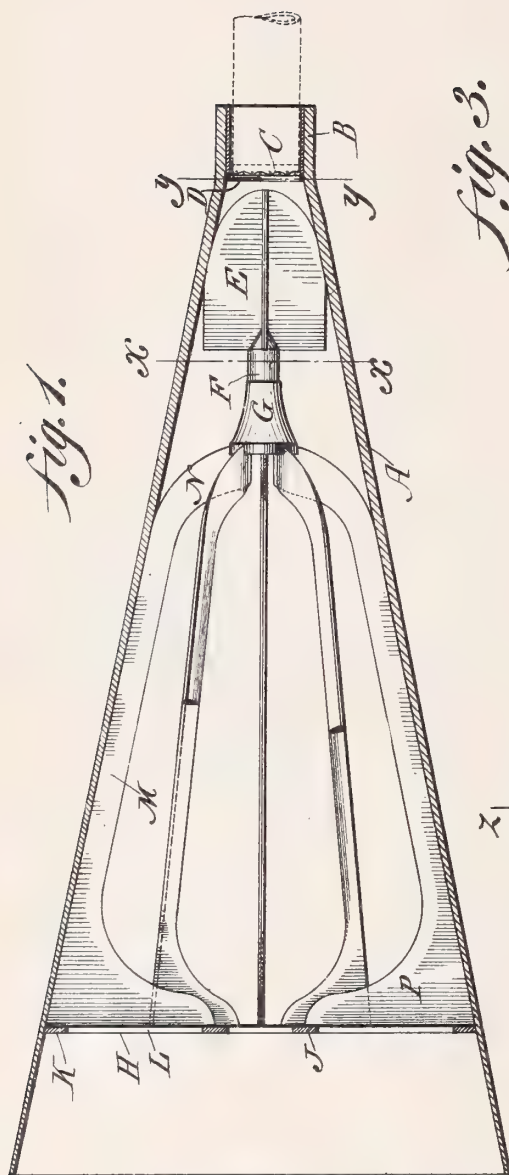


fig. 3.

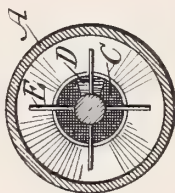


fig. 4.

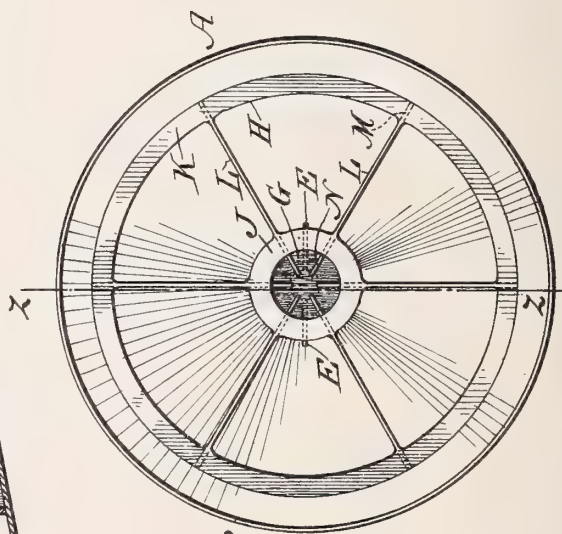


fig. 2.



fig. 5.

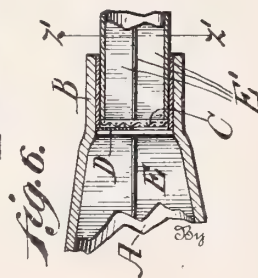


fig. 6.

Witnesses
L. Douville,
P. F. Hagel.

Inventor
Edwin A. Heyl.
Niederstein & Kaibank.
Attorneys

UNITED STATES PATENT OFFICE.

EDWIN A. HEYL, OF PHILADELPHIA, PENNSYLVANIA.

HORN FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 708,810, dated September 9, 1902.

Application filed July 11, 1900. Renewed August 4, 1902. Serial No. 118,333. (No model.)

To all whom it may concern:

Be it known that I, EDWIN A. HEYL, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Horns for Talking-Machines, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of a horn for a talking-machine having novel features, as will be claimed.

Figure 1 represents a central longitudinal section of a horn constructed in accordance with my invention and taken on line $z z$ of Fig. 2. Fig. 2 represents an end elevation thereof. Fig. 3 represents a transverse section on line $x x$, Fig. 1. Fig. 4 represents a transverse section taken on line $y y$, Fig. 1. Fig. 5 represents a transverse section of another embodiment of my invention, taken on line $z z$ of Fig. 6. Fig. 6 represents a longitudinal section thereof.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, A designates a horn which is of ordinary construction and provided with a nozzle B, by means of which it is attached to the tube of the talking instrument. (Shown in dotted lines in Fig 1.) By a series of instrumentalities contained within the horn and situated between said nozzle B and the large or flaring end thereof I am enabled to not only modify the vibration of the horn itself, but to so control the sound-waves produced by the talking-machine that the human voice making the record is naturally reproduced devoid of the usual harsh and metallic qualities, so that it is even possible for one to recognize the reproduction of his own voice, which, as far as I am informed, has not been successfully attained heretofore. In the embodiment of my invention illustrated and which I have successfully operated the said horn is provided at its small end with a screen or reticulated plate C, upon the side of which is secured the palate D, the latter being flexible and fastened at its outer end as a flap and resting freely against the face of said screen or reticulated plate C, said palate being of a sound-non-producing nature. Near said nozzle are

a plurality of wings E, conveniently radiating from the axial line of the horn and secured at their outer ends to a block F, that is mounted upon a cone G. Near the outer or larger end of the horn is a sounding-plate H, fastened therein and comprising an outer ring K and an inner ring J, joined by radial spokes L. Extending from the cone G and the sounding-plate H and firmly connected therewith are a plurality of blades M, the shape of which is shown in Fig. 1 and which extend longitudinally of the horn, but in radial planes coincident with said spokes L, and engage at their backs with the inner surface of the horn. For a greater portion of their length these blades M extend along the inner face of the horn, but are deflected inwardly, as shown at N, at one end and fastened to the cone G, while at their opposite ends they are provided with inwardly-extending enlargements P, extending from the outer to the inner ring of the sounding-plate, as shown in Fig. 1, said enlargements P being fastened to the said rings and to the spokes L, against which they abut as braces for the horn. As before stated, the vibrations of the horn itself are modified, and this is secured by arranging the said blades M and sounding-plate K, which serve to brace the walls of the horn and to modify the character of the vibrations thereof, so as to eliminate this former objectionable feature in talking-machine horns, and also causing clearer enunciation of the sound directed from the horn.

I have found that by employing the instrumentalities above described the human voice is more naturally produced, which, as far as I am informed, is because the sound-waves entering the horn are so controlled that the harsh and metallic reproduction is avoided. This seems to be due to the fact that I arrange within the horn instrumentalities that divide the volume of the sound-waves, which seems to prevent augmentation of the volume of the sound produced and to retain to a greater degree its natural character, it being noticed that the sound-waves passing through the screen or reticulated plate are softened and rounded to a certain extent by the palate D and then deflected by the wings E and spread by cone G. They

are also deflected through the openings between the two rings and the central ring.

In Figs. 5 and 6 wings are situated on both sides of the screen C, the wings E being arranged the same as heretofore described beyond the outerside of the screen C, while the wings E' are arranged beyond the inner side of the said screen C and within the nozzle B.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn of the character stated having a sound-non-producing palate of flexible material in the interior thereof.

2. A horn of the character stated having on the interior thereof a plate of reticulated material and a flexible palate of sound-non-producing material adjacent thereto.

3. A horn of the character stated having therein a plate of reticulated material, a sound-non-producing palate of flexible material, and separated wings, said palate being forward of said plate and said wings forward of said palate.

4. A horn of the character stated having therein separated blades which engage at their backs with the interior surface of the horn and extend in the longitudinal direction thereof.

5. In a horn of the character specified, a plurality of longitudinal blades, a support for one end of said blades, and a plurality of wings carried by said support.

6. A horn of the character stated having

therein separated blades which engage at their backs with the interior surface of the horn in the longitudinal direction thereof, and an annulus connected with said blades and horn.

7. A horn of the character specified, provided with a reticulated plate at its small end, a flexible palate secured against said plate, wings secured within the small end portion of the horn, a cone in the rear of said wings, blades extending from said cone longitudinally along the interior face of the horn and provided with enlarged outer ends, and a sounding-plate secured within the large end of the horn and against the outer enlarged ends of said blades.

8. In a horn of the character specified, a plurality of longitudinal blades secured therein and provided with enlarged inwardly-extending ends.

9. In a horn of the character specified, a plurality of longitudinal blades, one of the ends of which is enlarged, and the other ends being deflected.

10. In a horn of the character specified, longitudinal blades extending along the inner face of the horn, one of the ends of which is enlarged, and the other ends being deflected inwardly and suitably supported.

EDWIN A. HEYL.

Witnesses:

JOHN A. WIEDERSHEIM,
C. D. McVAY.

No. 708,828.

Patented Sept. 9, 1902.

A. N. PETIT.
SOUND RECORD OF CELLULOID.

(Application filed July 30, 1900.)

(No Model.)



Inventor

Ademore N. Petit.

Witnesses

Chas H. Smith
J. Staib

for

L. W. Serrell & Son

attys

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

SOUND-RECORD OF CELLULOID.

SPECIFICATION forming part of Letters Patent No. 708,828, dated September 9, 1902.

Application filed July 30, 1900. Serial No. 25,300. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented a new and useful Sound-Record of Celluloid, of which the following is a specification.

My invention relates to a sound-record of celluloid, the record being produced by engraving or, in other words, cutting into the surface of the celluloid.

Heretofore efforts have been made to record sound upon celluloid by impressing the record into the celluloid; but these have been attended with indifferent results. In an effort to produce sound-records in celluloid it is quite essential either that the surface of the celluloid be treated and prepared in order that it may be engraved or cut into in recording the sound or that the celluloid in its manufacture be so produced that the same cutting is equally possible.

My present invention is a new article of manufacture; and it consists of an engraved sound-record of celluloid. The sound-record of celluloid may be a disk or tablet of celluloid, a strip of celluloid, or a cylinder, it being possible with a suitable device to produce a sound-record on celluloid in any of these forms.

In Letters Patent granted to me December 4, 1900, No. 662,961, I have described and claimed certain materials adapted for treating celluloid so as to prepare the surface for the engraving or cutting therein of sound-records, and in an application of like date herewith I have described and claimed the method of treating celluloid for the production of sound-records.

In the drawing I have represented my improvement by a longitudinal section of a celluloid cylinder with a record cut upon a portion of the same.

I prefer in forming the engraved sound-

records of celluloid to treat the surface of the celluloid with materials adapted to sink into and be absorbed or taken up by the celluloid, so that the molecular structure of the celluloid surface is rendered comparatively soft and plastic for a period if the air is kept away. The materials set forth in my aforesaid application are capable of rendering the surface thus comparatively soft and plastic, but not sticky or gummy. These materials change the character of the celluloid tissue, of the surface filling the cells, and, in fact, rearranging the molecular structure, so that the surface is simply plastic for a period and sufficiently so to render the operation of engraving and cutting and so recording sound a comparatively simple and easy operation. The celluloid of which such record is made after treatment hardens considerably, and while it may not become fully as hard as originally, yet the surface is comparatively hard and the record is much more lasting and serviceable for repeated use than any composition records heretofore produced. It makes no difference with reference to my invention whether the surface of the celluloid is dull or highly-polished or whether the same is plain or colored.

I claim as my invention—

1. As a new article of manufacture, a cylinder of celluloid having thereon an engraved sound-record.

2. As a new article of manufacture, a cylinder of celluloid having a prepared surface and a sound-record engraved thereon.

3. As a new article of manufacture, a celluloid tablet having engraved thereon a record of sound.

Signed by me this 18th day of July, A. D. 1900.

ADEMOR N. PETIT.

Witnesses:

MARY J. G. CONNINGTON,
BERTHA M. ALLEN.

No. 708,849

Patented Sept. 9, 1902.

H. G. A. I. WIEDER.
SOUND REPRODUCER.

(Application filed Sept. 21, 1901.)

(No Model.)

Fig.1.

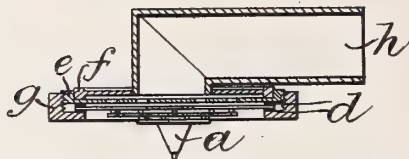


Fig.2.

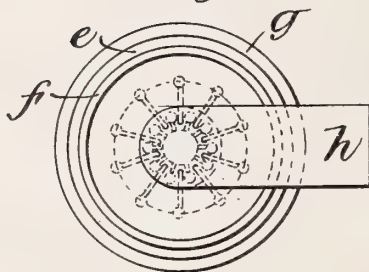


Fig.3.

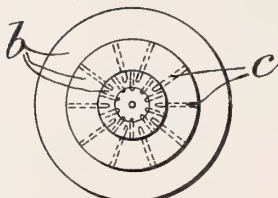


Fig.4.



Witnesses:
T. Gerhardt

A. Witt.

Inventor:
Henry G. A. I. Wieder,
By *H. A. de Vos.*
Attorney -

UNITED STATES PATENT OFFICE.

HENRY GEORGE A. I. WIEDER, OF LONDON, ENGLAND, ASSIGNOR TO
CHARLES WILLIAM PHILLIPS, OF LONDON, ENGLAND.

SOUND-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 708,849, dated September 9, 1902.

Application filed September 21, 1901. Serial No. 76,108. (No model.)

To all whom it may concern:

Be it known that I, HENRY GEORGE ABRAHAM ISAAC WIEDER, a subject of the Emperor of Austria-Hungary, whose post-office address is 25 Victoria street, Westminster, London, England, have invented a certain new and useful Improvement in Sound-Reproducers, of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a recording and reproducing device for phonographs and instruments of like character for the reproduction of sounds of such construction that the same will have little likelihood of getting out of order and by the use of which the sound, while being given in the tone by which it is produced, will be free from false tones and vibrations.

To such ends my invention consists in substance of a vibratory disk or diaphragm secured at the edges in a suitable casing with a resilient material interposed between the edges of the disk and the casing, a coil of wire or like material secured upon the outer side or face of such disk, a second disk secured to the outer side of such coil, a like coil secured upon the outer side of the second disk, a third disk secured upon the outer side of the second coil, a cone, preferably hollow, secured at the base to the outer side of the third disk, a reproducing or recording point of suitable material secured in the paper of the cone, and a sound-conducting channel in communication with the rear of the first disk or diaphragm. It is not to be understood that my said invention is limited to a device comprising at once all of said devices and parts, as the same consists of the particular construction of certain devices and parts and the particular combination and arrangement of certain devices and parts, all as hereinafter more particularly set forth in the description of this specification and pointed out in the claims.

I will now describe the invention with reference to the accompanying drawings, in which—

Figure 1 shows a sectional view of the instrument with the cone and conducting-tube. Fig. 2 shows a plan view of the same from

the back, the glass disks and wires being shown by dotted lines. Fig. 3 shows a plan view of the glass disks and cone taken from the front, the wires being shown by dotted lines. Fig. 4 shows an elevation of Fig. 3.

a is a small hollow metal cone having a sapphire-point which touches the record.

b b b are three glass disks, the lower of which is connected to the cone *a* and the upper faces the perforated vulcanite disk.

c c are two series of rays of wire, (preferably aluminium,) one of which is placed between each of the three glass disks and which are cemented thereto.

d d are two rubber washers, one of which is placed on each side of the larger glass disk.

e is a perforated vulcanite disk which breaks the sound-waves.

f is a thin metal back or disk with central aperture opening to the conducting-tube *h*.

g is an annular rim or ring of L-section which screws onto the vulcanite disk *e* and connects the glass disks thereto.

h is the conducting-tube which can be attached to the usual funnel-shaped trumpet.

The operation of the instrument is as follows: The vibrations caused by contact of the point with a rotating cylindrical record or by sound-waves impinging on the cone are transmitted by contact to the smaller glass disk, and thence pass through the wire rays to the intermediate disk, and again through the wire rays on to the largest glass disk, where they arrive in a magnified condition, and are then transmitted by vibration to the air contained in the inclosed space between the large glass disk and the vulcanite disk, where they are broken up by having to pass through a number of holes in the vulcanite disk, and they then proceed to the second inclosed space between the vulcanite disk and the metal back, and thence they pass in a clear, resonant, and human tone of voice through the conducting-tube to the trumpet. The action of passing in this way through the reproducer removes all rasping metallic sounds and brings out in perfection the difficult low or high sounds in a natural manner and with a perfection which all other mechanical speakers have failed to accomplish.

I claim—

1. In a device of the class described, the combination one with the other of three disks of different diameters concentrically interposed one upon the other and separated from each other by wires radiating from the common center thereof, substantially as shown and described and for the purpose set forth.

2. In a device of the class described, the combination one with the other of three disks of different diameters concentrically interposed one upon the other and separated from each other by wires radiating from the common center thereof and a recording or reproducing point secured to the outermost disk, substantially as shown and described.

3. In a device of the class described, the combination one with the other of three disks of resilient material of different diameters concentrically interposed upon each other, and separated from each other by wires radiating from the common center thereof, and a cone provided at the point with a recording or reproducing point, the base of which cone is secured to the outer disk, substantially as shown and described.

4. In a device of the class described, the combination with three disks of resilient material interposed concentrically upon each other so that their centers are coincident, of

a recording or reproducing point carried by the outermost disk, wires radiating from the common center interposed between the disks, a casing supporting the periphery of the innermost disks, and a perforated back plate securing such disk therein, substantially as shown and described.

5. In a device of the class described, the combination one with the other of a cone *a*, the concentrically-arranged glass disk *b* separated by the wires *c* and cemented thereto, the perforated vulcanite disk *e*, and the metal back *f* connected by the inclosing rim *g*, substantially as shown and described.

6. In a device of the class described, the combination one with the other of a cone *a*, the concentrically-arranged glass disks *b* of different diameters separated by the wires *c* and cemented thereto, the perforated vulcanite disk *e*, and the metal back *f* connected by the inclosing rim *g*, substantially as shown and described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY GEORGE A. I. WIEDER.

Witnesses:

SAMUEL S. BROMHEAD,
HENRY FAIRBROTHER.

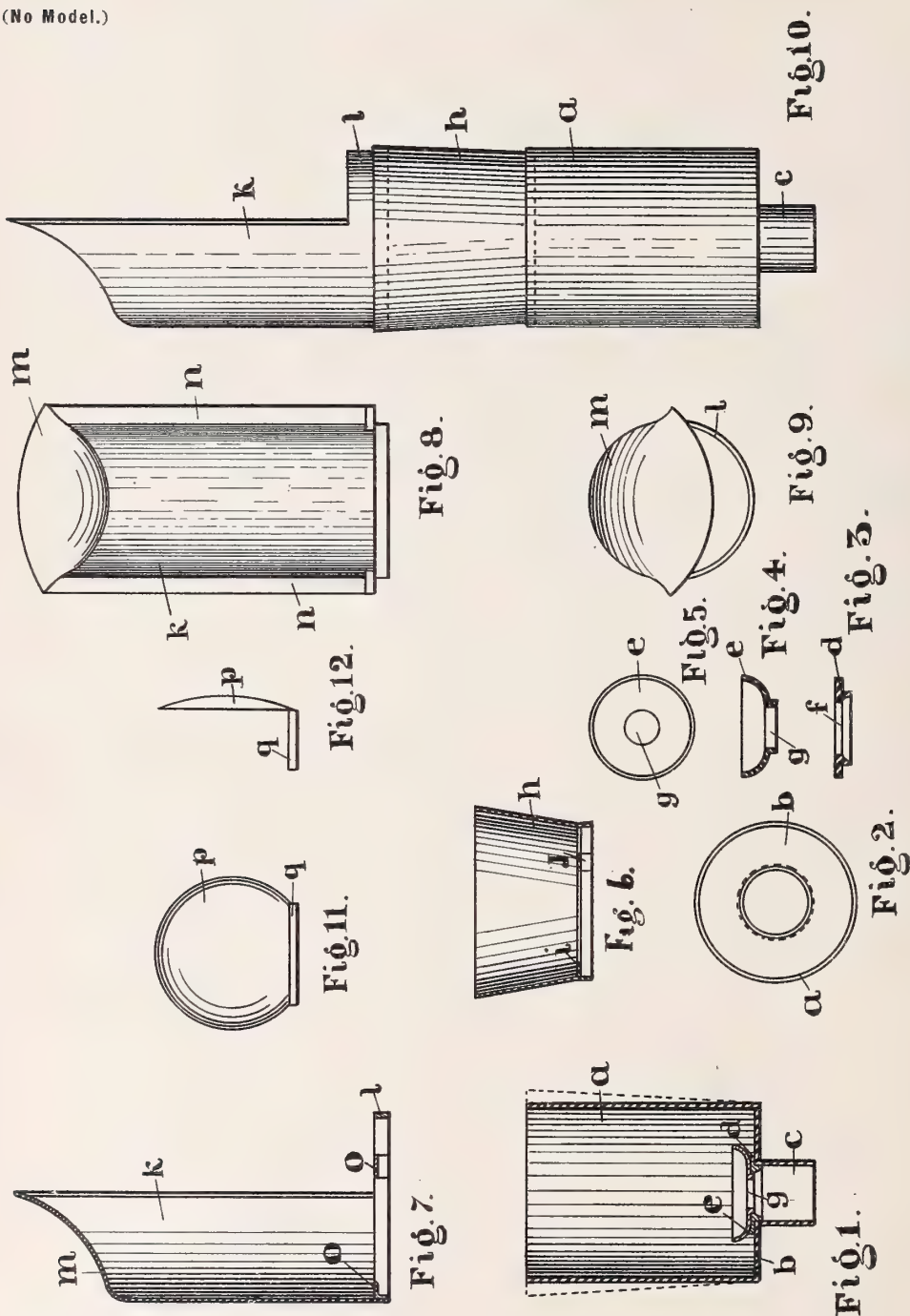


W. S. HOW.

RESONATOR OR AMPLIFIER FOR PHONOGRAPHS.

(Application filed Mar. 1, 1901.)

(No Model.)



Witnesses.

Rich Kennedy
Chas. Partridge

Inventor.

William Samuel How
by Samuel Salaman
his attorney

UNITED STATES PATENT OFFICE.

WILLIAM SAMUEL HOW, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF
TO GEORGE LINDSAY JOHNSON, OF LONDON, ENGLAND.

RESONATOR OR AMPLIFIER FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 709,984, dated September 30, 1902.

Application filed March 1, 1901. Serial No. 49,476. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SAMUEL HOW, a subject of the King of Great Britain, residing at 35 Albany street, Regents Park, London, England, have invented new and useful Improvements in Resonators or Amplifiers for Phonographs and other Instruments for Recording and Reproducing Sounds, of which the following is a specification.

10 The object of this invention is to enable phonographs and such like instruments to reproduce the human voice in a more natural manner than heretofore and to eliminate the squeaky, metallic, and nasal element therefrom.

My improved resonators, amplifiers, and reflectors are shown by the accompanying drawings, in which—

Figure 1 represents a section of a resonator or amplifier constructed according to this invention. Fig. 2 is a plan of same. Fig. 3 is a section of one form of perforated modulator. Fig. 4 is a section of another form of perforated modulator. Fig. 5 is a plan of same. Fig. 6 is a section of a conical piece which may be used in conjunction with the resonator shown by Figs. 1 and 2. Fig. 7 is a section of a reflector which may be used in conjunction with the apparatus shown by Figs. 1, 2, and 6. Fig. 8 is a front view of same. Fig. 9 is a plan of same. Fig. 10 shows the resonators and reflectors used together. Fig. 11 is a front view of another form of reflector. Fig. 12 is a side view of same.

35 The same letters denote the same parts in all the figures.

a is a cylinder, of vulcanite, papier-mâché, or of any other suitable material, open at the top and provided with a flat bottom *b*, to which is attached or formed integral there- 40 with a short cylindrical neck *c*, which fits onto the phonograph or other similar apparatus in place of the usual trumpet. The cylinder *a* and neck *b* form the resonator or amplifier.

45 *d e* are perforated diaphragms or stops which are fitted into the bottom of the cylinder *a*, as shown by Fig. 1, when it is desired to reproduce the human voice. The diaphragms or stops *d* are made with apertures *f* of various diameters, and they may either be used alone or in combination with the stops

e, which may also be made with apertures *g* of various sizes. As will be seen by referring to the drawings, Figs. 1, 3, and 4, the diaphragm or stop *e* is cup-shaped above the aperture *g*, while the diaphragm or stop *d* is cup-shaped below the aperture *f*. 55

When it is necessary or desirable to amplify or intensify the sounds produced by the instrument still more than the cylinder *a* is capable of effecting, I provide a cone *h*, (shown in section at Fig. 6 and in elevation at Fig. 10,) of vulcanite, papier-mâché, or of any other suitable material, which is provided at the bottom with an internal flange *i* or lugs *j*, which flange or lugs rest on the top of the cylinder *a* when the cone *h* is used in conjunction therewith, or, if preferred, the cone *h* may be made to fit inside the cylinder *a*, as shown by Fig. 10. If the sound requires still further amplification—as, for instance, if the instrument is being used in large halls—I may use a second similar (but larger) cone to that shown by Figs. 6 and 10 and which fits in or on the mouth of the cone *h*. In some cases—as, for instance, when the instrument is placed at one end of a large hall and it is desired to enable the entire audience to hear the reproduced sounds—I make use of the reflector *k* (shown by Figs. 7, 8, and 9) to effect this result. This reflector consists of an approximate semicylinder of any suitable material attached to a ring *l*, the semicylinder *k* being provided with a covered top *m* and side wings *n n*. 85

o o are lugs secured to the inside of the ring *l* to support the reflector *k* on the top of the cone *h*, or the reflector *k* may be made to fit inside the mouth of the cone *h*, as shown by Fig. 10. The reflectors may also be spherical, elliptical, or parabolic, and are produced by pressing or otherwise forming a circular piece of suitable material into the required curvature. Such a reflector is shown by Figs. 11 and 12, the reflector *p* being secured to a ring *q* to enable it to be fitted to the cylinder *a* or to the cone *h*. 95

This invention is applicable to instruments in which the record is inscribed on a disk instead of a cylinder by using a suitable connecting-piece between the sound-box and the resonator or amplifier. 100

Although I prefer to use a cylinder *a*, I may use a cone, as indicated by dotted lines, Fig. 1. The most suitable materials for my improved resonators or amplifiers are vulcanite, celluloid, papier-mâché, wood, and other non-metallic substances, those substances which are homogeneous giving the best results.

By using resonators or amplifiers constructed as hereinbefore specified the harsh, metallic, and nasal quality of the sounds produced by phonographs and other sound-recording instruments is avoided and the reproduction of the record of the human voice is rendered almost perfect.

What I claim, and desire to secure by Letters Patent, is—

1. In a resonator or amplifier for phonographs and the like the combination of a tube *a* having a flat bottom *b* and a cylindrical neck *c* with one or more cup-shaped modulators *d e* having apertures *f g* in the bottom thereof all substantially as specified for the purpose stated.

2. In a resonator or amplifier for phonographs and the like the combination of a tube *a* having a flat bottom *b* and a cylindrical

neck *c* with one or more cup-shaped modulators *d e* and a cone *h* adapted to fit the mouth of the tube *a* all substantially as specified for the purpose stated.

3. In a resonator or amplifier for phonographs and the like the combination with the tube *a* attached to the sound-box of the instrument, of a reflector consisting of a semicylinder *k* having a curved top *m* and side wings *n n*; the semicylinder *k* being secured to a ring *l* adapted to fit the mouth of the tube *a*, all substantially as specified for the purpose stated.

4. In a resonator or amplifier for phonographs and the like the combination of a tube *a* having a flat bottom *b* and a cylindrical neck *c* with one or more cup-shaped modulators *d e* a cone *h* adapted to fit the tube *a* and a reflector *k* having a curved top *m* and side wings *n n* and a ring *l* secured to the reflector *k* all substantially as specified and for the purpose stated.

WILLIAM SAMUEL HOW.

Witnesses:

ERNEST SALAMAN,
R. A. KENNEDY.

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

METHOD OF PRODUCING SOUND-RECORDS IN CELLULOID.

SPECIFICATION forming part of Letters Patent No. 710,299, dated September 30, 1902.

Application filed July 30, 1900. Serial No. 25,301. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in the Methods of Producing Sound-Records in Celluloid, of which the following is a specification.

My invention relates to the treatment of surfaces of celluloid for the purpose of engraving, cutting, plowing, or otherwise marking or ornamenting the same for use in the arts and forming phonograph-records thereon, the object sought being to temporarily soften and make plastic the said surface, so that it can readily be cut into, the materials employed for treating the surface thereafter evaporating and leaving the surface of the material again hard and serviceable.

My invention relates particularly to the treatment of phonograph blank cylinders of celluloid for the production of sound-records by material capable of temporarily rendering such surface appreciably soft and plastic, but not sticky, so that the instruments employed for recording sound or reproducing phonograph-records can readily cut into the same for producing the desired impression.

In carrying out my invention I employ as a material for treating the surface of celluloid a solvent of the material and a fatty acid or similar material. In my Letters Patent dated December 4, 1900, No. 662,961, I have described and claimed these solvent materials. These materials are in a liquid state, and in the method of employing the same the surface of the celluloid is coated one or more times with the liquid material, which sinks into and is absorbed or taken up by the celluloid. These materials may be combined into one liquid or employed separately and one after the other or the celluloid may be dipped into the liquid material. The celluloid is then to be exposed to the air for a period, so that these elements may combine with the celluloid to render the surface thereof appreciably soft and plastic, but not sticky, and sufficiently soft to permit the instruments employed for engraving, cutting, plowing, or otherwise marking or ornamenting the

said material to readily cut into the same for the purpose intended. The surface of the celluloid remains appreciably soft and plastic for a short period, said materials, however, gradually evaporating, so that eventually the surface of said celluloid returns almost to its normal condition and becomes almost as hard as originally. This condition is desirable with articles subject to much wear, because otherwise the surface would be readily dented and injured. Such a condition is especially desirable with phonograph-records, because thereby the life of the record is prolonged and the delicate indentations produced by the sound of the recorder are not readily rubbed down and obliterated.

As a solvent for celluloid I prefer to employ amyl acetate and as a fatty acid oleic acid, although said ingredients form no essential part of my present application. The surface of the celluloid after treatment with the said ingredients and in said manner may be kept comparatively soft and plastic for quite a time if the air is kept away. It is well known that the application to celluloid surfaces of a solvent material alone is liable to render the surface soft, gummy, and sticky and unfit for the purpose of cutting or engraving. The addition, however, to the solvent of a fatty acid or similar material, as hereinbefore stated, changes the character of the celluloid tissue of the surface, filling the cells, and, in fact, rearranging the molecular structure, so that the surface is simply plastic without being sticky or gummy, the surface being in such condition that the cutting instrument can cut clearly, readily, and without clogging. It makes no difference in the application of my invention whether the surface of celluloid is dull or highly polished, as the materials act equally as well upon either surface. The materials hereinbefore stated, as well as the method of employing same, act equally well on colored or plain celluloid.

I claim as my invention—

1. The method herein specified of forming phonograph-records of celluloid, consisting in coating or otherwise treating the surface of the celluloid cylinder with a liquid material absorbed or taken up by the celluloid and

so rendering the same temporarily soft and plastic, cutting the sound-record in the surface of the celluloid cylinder and allowing the said material to evaporate and the surface to dry and harden before use, substantially as set forth.

5 2. The method of producing sound-records in celluloid, which consists in first softening the celluloid, then permitting it to stand until

it assumes a crisp consistency, and while in that condition cutting or engraving therein a record of sound, substantially as described.

Signed by me this 18th day of July, A. D. 1900.

ADEMOR N. PETIT.

Witnesses:

BERTHA M. ALLEN,

MARY J. G. CONNINGTON.

1771

No. 711,706.

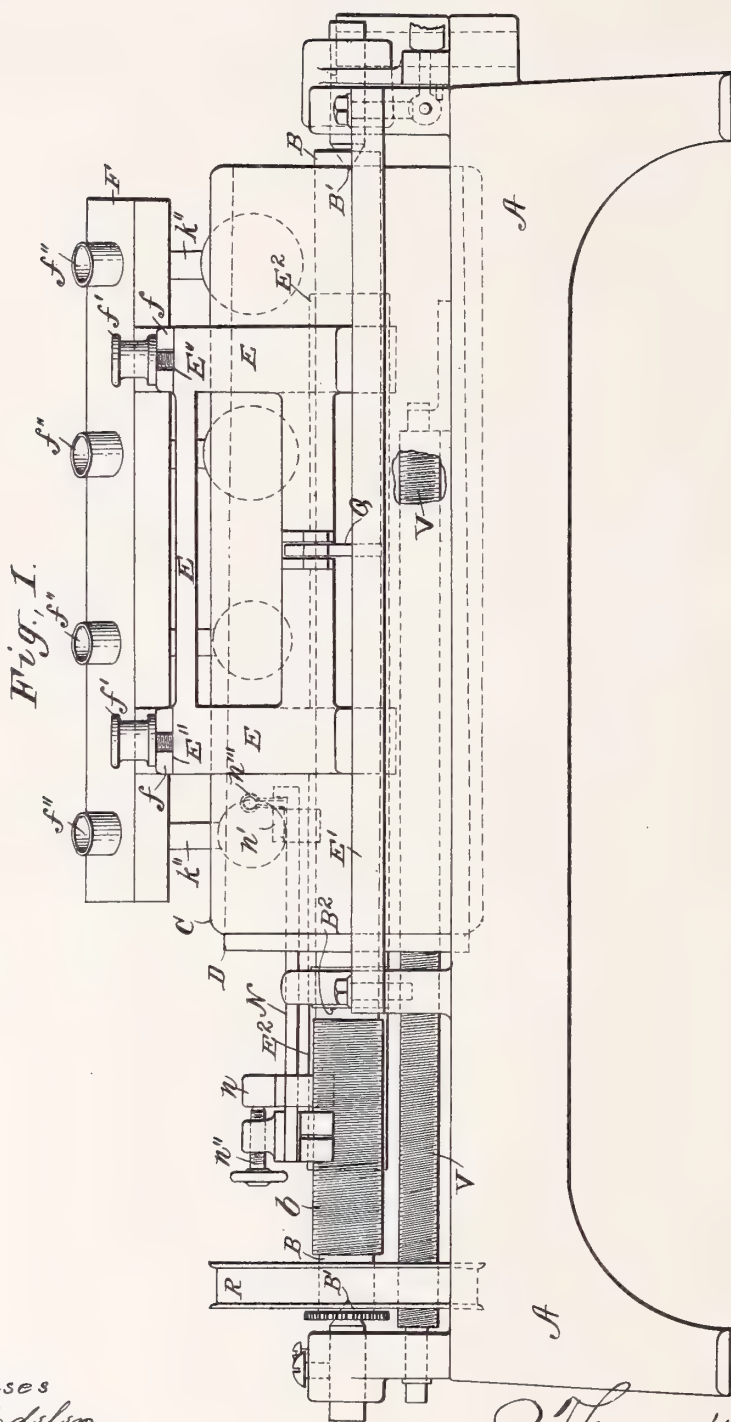
Patented Oct. 21, 1902.

T. H. MACDONALD.
MULTIPLE GRAPHOPHONE.

(Application filed June 11, 1898.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses
H. R. Edsley.
J. W. Turner

Inventor.
Thomas H. Macdonald
by Forster Mauro
his attorneys.



T. H. MACDONALD.
MULTIPLE GRAPHOPHONE.

(Application filed June 11, 1898.)

(No Model.)

3 Sheets—Sheet 2.

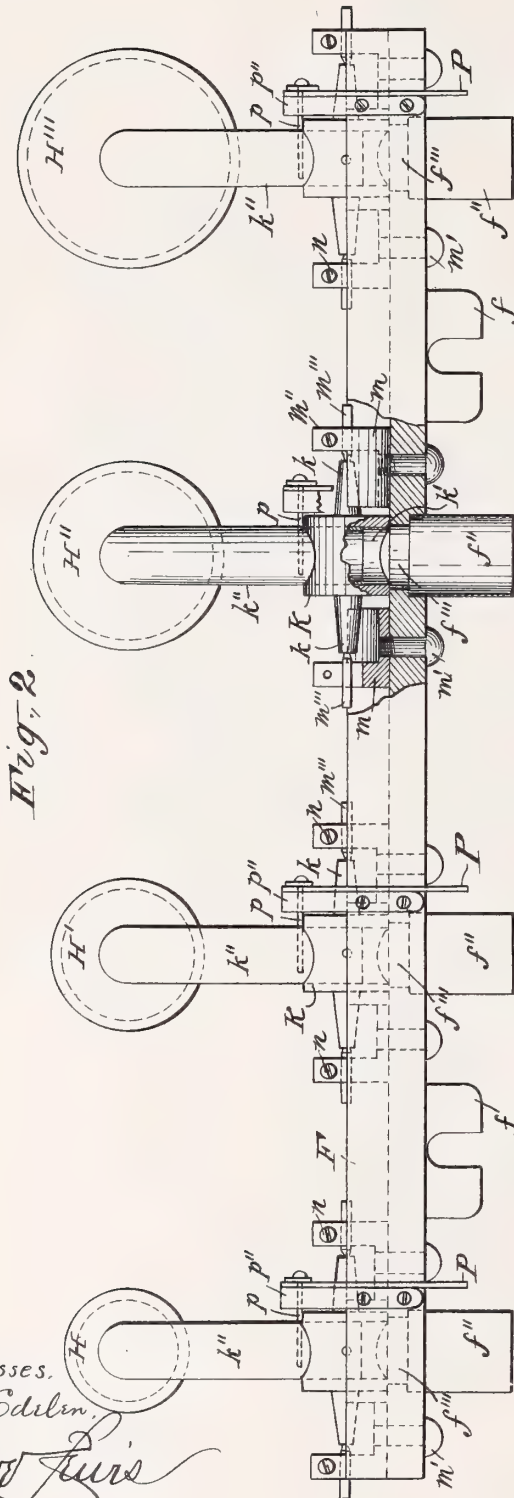


Fig. 2.

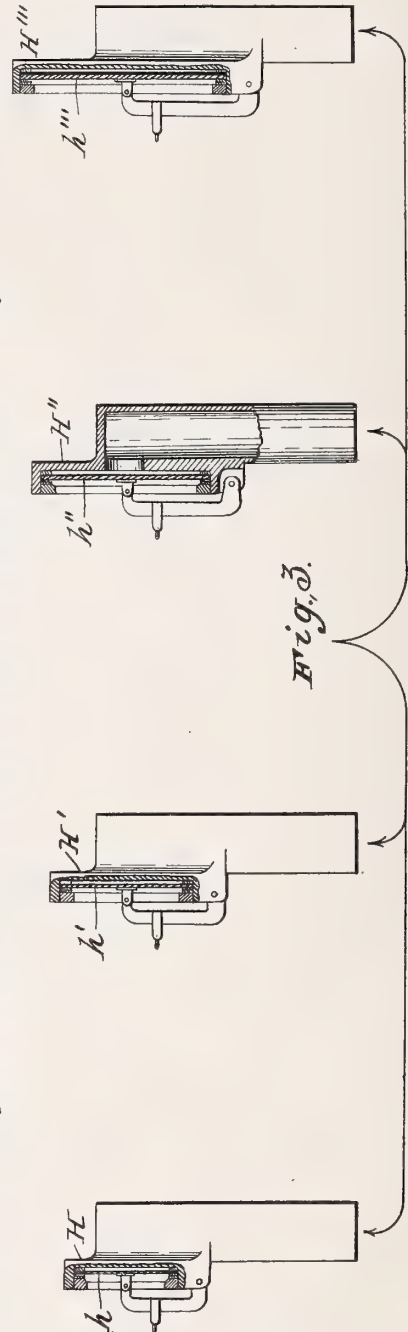


Fig. 3.

Witnesses.

H. R. Edlin.

Edwin Lewis

Inventor.
Thomas H. Macdonald
by *John F. Mauro*
his attorney.



No. 711,706.

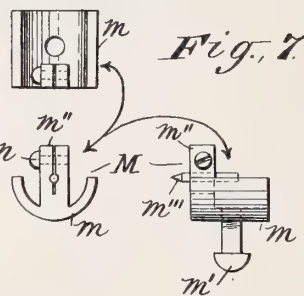
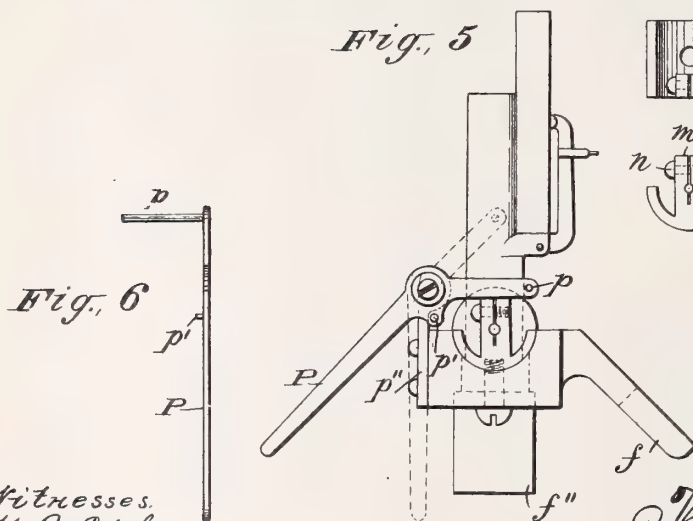
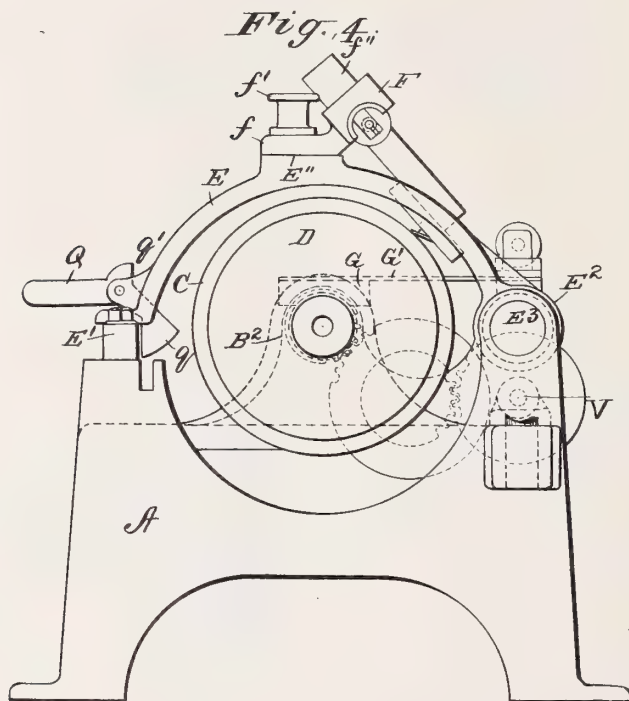
Patented Oct. 21, 1902.

T. H. MACDONALD.
MULTIPLE GRAPHOPHONE.

(Application filed June 11, 1898.)

(No Model.)

3 Sheets—Sheet 3.



Witnesses.

H. R. Edsall

For Lease

Inventor

Thomas H. Macdonald
by *For Lease*
his attorney

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

MULTIPLE GRAPHOPHONE.

SPECIFICATION forming part of Letters Patent No. 711,706, dated October 21, 1902.

Application filed June 11, 1898. Serial No. 683,230. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in

5 Multiple Graphophones, which improvement is fully set forth in the following specification.

It has been proposed heretofore to actuate a plurality of recording-points by the diaphragm of a sound-recorder, so as to make
10 several records simultaneously, either on the same recording-tablet or on separate tablets. It has also been proposed to arrange a number of recorders (each having a single stylus) to act simultaneously upon a recording-surface, each to make a record for a single voice or instrument. The object of the plan first mentioned has been either to multiply the production of sound-records or to obtain in reproducing louder effects. The object of
20 the second plan has been to reproduce the different records simultaneously, thus obtaining the effects of concerted music. This latter plan (which more nearly than the first resembles my present invention) has never
25 been realized in practice, mainly because no effective means have been known whereby a number of reproducing instruments could be made to work in absolute unison from a multiple record, but partly also because good
30 practical records of a number of voices or instruments are obtained with a single diaphragm and recording-stylus.

The object of the present invention is primarily to obtain superior acoustical results
35 in recording and reproducing concerted music, either vocal or instrumental.

I have found that recording and reproducing instrumentalities which give the best results for sounds of a particular character are
40 not the most suitable for sounds of a different character. This applies particularly to the diaphragm. For sounds of high pitch a diaphragm of smaller diameter and less thickness should be used to produce the best results, whereas for sounds of lower pitch a
45 diaphragm of greater diameter and thickness is more effective. This applies as well to the diaphragm of the reproducer as to that of the recorder. Consequently when a single re-
50 corder or reproducer is used the best that can

be done is to proportion the diaphragm to sounds of intermediate pitch. It is also found that the diaphragm of a graphophone can respond effectively to but a limited number of instruments. It will record effectively an orchestra of, say, eight or ten instruments, but doubling the number of instruments would not increase the fullness of tone in anything like the same proportion. The resultant sound-wave becomes too complex for the diaphragm to follow. By using, in the manner hereinafter described, a number (two or more) of recorders and a corresponding number of reproducers I am able to obtain acoustical effects superior in quality and superior also
65 in fullness as distinguished from mere loudness. To this end the multiple graphophone is provided with any desired number—say four—of recorders, each having a diaphragm differing in diameter and thickness from the
70 others. In making records with this instrument the performers will be so grouped and the sound-conveying tubes so arranged that the great volume of the sound of high pitch will converge upon the most sensitive diaphragm, those of a lower pitch upon a less
75 sensitive diaphragm, and so on.

The invention also embraces improvements in mechanical construction, and particularly in the means for securing requisite harmonious operation of the several recording and reproducing devices, as will be hereinafter more fully described.

One embodiment of my invention is illustrated in the accompanying drawings, in 8;

Figure 1 is a front elevation of the multiple graphophone. Fig. 2 is an enlarged side elevation, with parts broken away, of the carrier-bar and the recorders or reproducers supported thereby. Fig. 3 is a view illustrating the proportionate thickness of the several diaphragms, said thickness in each case being somewhat exaggerated for the sake of clearness. Fig. 4 is an end view of Fig. 1, showing a recorder in operative position. Fig. 5
95 is an end view of Fig. 2, showing the manner of mounting the recorders and reproducers on the carrier-bar and the means for individually raising the recorder or reproducers
100

from the record. Fig. 6 shows an edge view of the lifting-lever; Fig. 7, a plan, end, and side elevations of the bearings for the recorders and reproducers.

- 5 A is the frame of the machine, and B is a shaft mounted to turn on bearings B' at each end of the frame and bearing B² in a bar extending across the frame between the bearings B' B'. The surface of this shaft, near
10 one end thereof, is screw-threaded, as shown at *b*, between one of the end bearings B' and the bearing B², and for the remainder of its length it supports the mandrel D, over which the cylindrical tablet C may be slipped, the
15 length of the screw-threaded portion *b* being only a fraction of the length of the mandrel D.

- The carriage for the recorder or reproducer bar F consists of two cross-arms E, spanning
20 the machine from side to side, suitably spaced by bars *e e'* and having their front ends bearing upon the guide-rest E', while their rear ends are connected to the sleeve E², traveling on the guide or way E³, Fig. 4.

- 25 G is a half-nut resting normally upon the screw *b* and having an arm G' connecting it to the bar N, sliding longitudinally of the sleeve E² in bearings *n n'*, rigidly secured to said sleeve. One end of the bar N has a
30 screw-nut secured thereto, through which a screw *n''* is passed, with its end abutting the bearing *n* of the sleeve E², and a spring *n'''* (see Fig. 1) is interposed between the bearing *n'* and an upturned lug on the sleeve E²,
35 said spring acting in opposition to the screw *n''*, whereby the bar N may be adjusted in either direction along the sleeve E² by operating the screw *n''*. The cross-arms E have
40 each a level smoothly-planed surface *e''*, upon which surfaces the recorder or reproducer bar F is supported. This bar F has slotted lugs *f*, whose under sides are planed, so as to bear smoothly and evenly upon the surfaces
45 *e''*, the screws *f'* serving to firmly hold the bar in position and the slots in the lugs *f* permitting the ready removal and replacement of the bar by simply loosening the screws. The bar F has projecting from its face a number
50 of tubes *f''*, there being one of such tubes for each recorder or reproducer to be used. On the under side, or the side opposite the projecting tubes *f''*, the bar has formed therein a longitudinal concave groove or channel, preferably semicylindrical in cross-section,
55 said channel being connected with the tubes *f''* by holes *f'''*, as shown in Fig. 2.

- H H' H'' H''' are the recorders or reproducers, here shown as four in number, though
60 any desired number may be employed, and *h h' h'' h'''* are the diaphragms thereof. Of these diaphragms *h* has the least diameter and is the thinnest, it being designed to record or reproduce sounds of a high pitch, while diaphragm *h'* is of a slightly-larger
65 diameter and is a little thicker than diaphragm *h* and is intended to record or reproduce sounds of a mediumly-high pitch, but

lower than those sounds in connection with which diaphragm *h* operates. In a like manner diaphragm *h''* is of greater diameter and
70 thicker than *h'*, and *h'''* is of greater diameter and thicker than *h''*, each being designed to record and reproduce sounds of a pitch lower than the one preceding it in the series. In the drawings diaphragms *h, h', h'',* and *h'''* are
75 respectively three-fourths of an inch, one inch, one and one-quarter inches, and one and one-half inches in diameter, and I have found that with these diameters a very satisfactory thickness for the diaphragms to be *h*—.004 inch,
80 *h'*—.0055 inch, *h''*.007 inch, and *h'''*.0085 inch. The diaphragms of Fig. 3 have the thickness considerably exaggerated, owing to the difficulty of properly representing a diaphragm of .004 of an inch thick; but it will
85 be understood that the exact proportions of the diaphragms as shown in the drawings or as given herein are not essential, so long as several diaphragms differing in diameter and thickness are employed. It will be also un-
90 derstood that while I have for purposes of illustration shown in Fig. 3 diaphragms of reproducers the same principle of varying the diameter and thickness of the diaphragm
95 to suit the character of the sounds applies with equal force whether it be in connection with the diaphragm of a recorder or a reproducer.

For the purpose of mounting the recorders or reproducers on the bar F a cylindrical
100 trunnion-block K, provided with trunnions *k*, has a hole *k'* bored transversely through it, and the stem *k''* of the recorder or reproducer is inserted therein. Seated in the groove of the bar F and on opposite sides of each of
105 the holes *f'''* formed in the bar are bearing-blocks M, Figs. 2 and 7, the base *m* of the block being curved to fit the groove in the bar, in which it is secured by screws *m'* or other suitable means. The uprights *m''* of
110 the bearing-block M are split to form clamps, in which are held the bearing-points *m'''*, a screw or other device *n* being used to tighten the clamps, so as to securely hold the bearing-points *m'''* in any adjusted position. The
115 trunnion-blocks K when mounted to turn on the bearing-points *m'''* fit the groove in the bar F neatly, only sufficient clearance being allowed to admit of free motion. Provision is made whereby each one of the recorders
120 or reproducers may be separately raised from the record-tablet. For this purpose a lever P, Figs. 2, 5, and 6, is fulcrumed on a bracket *p''*, attached to the side of the bar F, said lever having a pin *p* extending under the stem
125 *k''* of the recorder or reproducer, as clearly shown in Figs. 2 and 5. A second pin *p'* projects from the side of the lever P in a position to be just free from contact with the bracket *p''* when the style of the recorder
130 or reproducer is resting on the face of the tablet C, so that said pin in no way interferes with the movements of the recorder or reproducer in relation to the tablet. If it

is found desirable to throw any one of the recorders or reproducers out of action, it is only necessary to turn the lever P from the full-line to the dotted-line position of Fig. 5,

when the pin *p* acts to lift the recorder or reproducer from off the tablet. A suitable restraining device may, if desired, be employed to engage and hold the lever P in the dotted-line position. Pivoted to the cross-bar *e'* of

the carriage is a lever G, having a face *q* formed on its inner end and a face *q'* on a lug projecting from the lever near its pivoted point. When it is desired to raise the carriage, so as to throw all the recorders or reproducers out of operative relation to the record-tablet C, the handle end of the lever is seized and the entire carriage lifted. As soon as the face *q* is raised above the top surface of the guide-rest E' the lever Q turns on its pivot until the face *q'* abuts the spacing-bar *e'*, at which time the face *q* will be immediately over the guide-rest E', and if allowed to bear upon said guide-rest will support the carriage in its elevated position.

When the carriage is thus raised, each recorder or reproducer is prevented by the engagement of the pin *p'* with the bracket *p''* from turning on its trunnions under the action of gravity, and hence the recorders and reproducers are raised with the bar F and the carriage.

R is a suitable driving-pulley on the shaft B. The bearing B' at the end of said shaft opposite the screw-threads *b* is mounted in an end gate, which is swung to one side when the tablet C is to be placed upon or removed from the mandrel D, but which is normally closed, so as to hold the bearing B' in operative relation with the shaft B, as is shown in Fig. 1.

In practice it is found more convenient to employ two bars F, one to carry a set of recorders and one a set of reproducers, the latter being spaced on the bar F so as to exactly correspond with the spacing of the recorders. In order to accomplish this, the recorders are mounted on the bar F and are arranged so as to be as nearly equidistant from each other as possible. The bar carrying the reproducers is next assembled, the bearing-blocks M being placed as nearly as possible to correspond with the ones on the recorder-bar. The reproducers are then swung between the bearing-points *m'''*, and one pair of these bearing-points—as, for example, the one at the left in Fig. 2—securely clamped. The other reproducers are then carefully spaced and set with reference to the fixed one and with reference to the corresponding recorder on the recorder-bar. For this purpose a suitable jig may be used, if desired, and the several reproducers having been adjusted so as to exactly correspond to the spacing of the recorders the bearing-points *m'''* are securely clamped. By this means it is rendered certain that the several reproducer-styles will

always occupy the same relative positions on the record-tablet that were occupied by the corresponding recorder-styles, and hence all sounds which are simultaneously recorded by the recorders will be simultaneously reproduced by the reproducers.

It will be apparent that the method of swinging the recorders and reproducers on trunnions having a considerable distance between the bearing-points and arranging these on a rigid bar gives the firm and accurate construction which is so highly essential in the production of even clear records. Considerable advantage is also gained by having a straight sound-tube of even diameter and a very close joint between the trunnion-blocks and the bar F.

Primarily the machine is intended for use as a multiple graphophone in which a plurality of recorders or reproducers shall operate at the same time, but obviously all of the recorders or reproducers except one may be thrown out of operation, when the machine will operate as an ordinary graphophone, using but a single diaphragm; but inasmuch as the carriage has a travel of but a fraction of the length of the record-cylinder, which, as shown in the present instance would be but one-fourth of such length, it would be impossible to utilize the entire surface of the record tablet or cylinder. For the purpose of using a single recorder or reproducer on the present machine in connection with the entire surface of the record-cylinder, as well as for the purpose of operating a shaver throughout the full length of the cylinder, I have provided a second screw-shaft V, journaled parallel with the shaft B in the frame A and screw-threaded throughout its entire length, the length of the shaft V being somewhat greater than that of the mandrel D. This screw-shaft V is connected by suitable gearing, as clearly shown in Fig. 4, with the shaft B. By removing the multiple carriage shown in the drawings and substituting a single carriage, with its nut in connection with the screw V, a recorder, reproducer, or shaver, as desired, may be caused to operate throughout the full length of the cylinder C.

It will be understood that while the machine herein described is a convenient and effective embodiment of my invention the invention itself is not limited to the construction described, but is broad enough to include any means whereby a plurality of diaphragms, each of which is especially adapted to sounds differing in character from sounds to which the others are adapted, are employed in the recording and reproduction of sounds.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a graphophone, the combination with a record-tablet, of a plurality of diaphragms having recording or reproducing points simultaneously contacting with said tablet dif-

ferent diaphragms being adapted to sounds differing in character from sounds to which other diaphragms are adapted.

2. In a graphophone, the combination with
5 a record-tablet, of a plurality of diaphragms having recording or reproducing points simultaneously contacting with said tablet different diaphragms being adapted to sounds differing in pitch from sounds to which other
10 diaphragms are adapted.

3. In a multiple graphophone, a plurality of simultaneously-operable recorders or reproducers having diaphragms of different thickness, substantially as described.

15 4. In a multiple graphophone, a plurality of simultaneously-operable recorders or reproducers having diaphragms of different diameters and thicknesses, substantially as described.

20 5. In a multiple graphophone, a plurality of recorders or reproducers having diaphragms of different diameters, the diaphragm having the greatest diameter being the thickest, and each of the other diaphragms being thinner than any diaphragm
25 having a greater diameter, substantially as described.

6. In a multiple graphophone, a plurality of recorders or reproducers and means for independently throwing any one of the recorders or reproducers into or out of operative relation with the record-tablet, substantially as described.

7. In a graphophone the combination of a
35 series of recorders or reproducers mounted on a suitable support, with means for independently adjusting said recorders or reproducers longitudinally of the series, substantially as described.

40 8. In a graphophone the combination of a recorder or reproducer, a transversely-bored trunnion-block having the stem of the recorder or reproducer inserted therein, with bearing-points supporting the trunnions of
45 said block, clamps engaging said bearing-points, and means for supporting said clamps, substantially as described.

9. In a graphophone, the combination of a transversely-bored body having a semicylindrical longitudinal channel therein, a pair of clamps secured in said channel on opposite sides of the bore and supporting longitudinally-adjustable bearing-points, with a trans-

versely-bored trunnion-block having the stem of a recorder or reproducer inserted therein, the trunnions of said block being supported by said bearing-points, substantially as described. 55

10. In a graphophone, a shaft supporting the record-mandrel and having a screw-threaded portion equal to but a fraction of the length of the mandrel, a second shaft having a screw-threaded portion as great as the length of the mandrel, and a carriage movable on a suitable way and having a nut engaging the screw-threads on one of said shafts, substantially as described. 60 65

11. In a graphophone, a carriage moving on a suitable way, a screw-threaded shaft, a nut engaging the screw-threads thereon, a connection between the nut and the carriage and means for longitudinally adjusting the nut on the carriage, substantially as described. 70

12. In a graphophone, a carriage moving on a suitable way, an adjustable slide on said carriage, a screw-threaded shaft, a nut engaging the screw-threads thereon, a suitable connection between said nut and slide and means for longitudinally adjusting said slide on the carriage, substantially as described. 75 80

13. An improved phonograph having a record-cylinder and a plurality of simultaneously-operative diaphragms or plates, each of said diaphragms or plates, by its construction, material or proportions, being adapted to respond to sounds of a given pitch or quality different from the others, with means for tracing records upon said cylinder. 85

14. An improved phonograph having a record-cylinder and a plurality of diaphragms or plates, each, by its construction, material or proportions, adapted to respond to sounds of a given pitch or quality different from the others, an individual stylus for each plate adapted to act simultaneously with the others on the cylinder and following an independent path on said cylinder. 90 95

In testimony whereof I have signed this specification in the presence of two subscribing witnesses. 100

THOMAS H. MACDONALD.

Witnesses:

C. A. L. MASSIE,
ELISHA K. CAMP.



No. 712,930.

Patented Nov. 4, 1902.

D. HIGHAM.
SOUND REPRODUCING APPARATUS.

(Application filed June 17, 1902.)

(No Model.)

Fig. 1

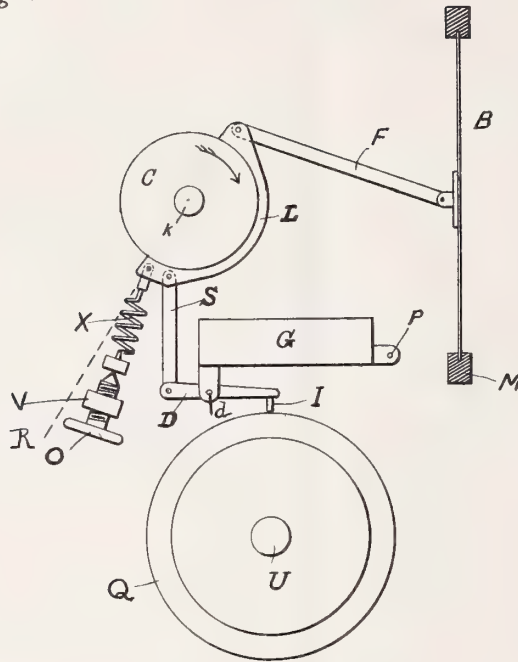
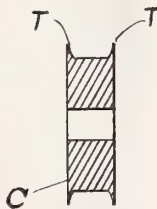


Fig. 2



WITNESSES:

Walter abbe
G. W. Wright

INVENTOR

Daniel Higham

BY

Howman and Howman
ATTORNEYS

UNITED STATES PATENT OFFICE.

DANIEL HIGHAM, OF WINTHROP HIGHLANDS, MASSACHUSETTS.

SOUND-REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 712,980, dated November 4, 1902.

Application filed June 17, 1902. Serial No. 112,080. (No model.)

To all whom it may concern:

Be it known that I, DANIEL HIGHAM, a citizen of the United States of America, residing at Winthrop Highlands, in the county of Suffolk, in the State of Massachusetts, have invented Improved Sound-Reproducing Apparatus, of which the following is a specification.

This invention relates to that method of reproducing a vibrating energy corresponding to sound-waves with increased power which is described in my Letters Patent dated July 16, 1901, numbered 678,566. The phonic apparatus of my said patent comprises a "primary" vibrating means acting upon a frictional means to vibrate the pressure at the frictional contact and "secondary" vibrating means responding to the resultant vibrating frictional force exerted by the frictional means.

The object of the present invention is to produce a more effective construction and combination of parts for the frictional means, as will be clearly understood by reference to the accompanying drawings, in which—

Figure 1 is a diagrammatical illustration of my invention, and Fig. 2 is an illustration in cross-section.

In the example illustrated in Fig. 1, B is a diaphragm supported by a frame M. (Shown in cross-section.) C is a roll revolved from any suitable source of motive power around an axis k in the direction of the arrow. L is a shoe held in frictional contact with the roll C by a compression or push spring X, supported at V. O is a set-screw serving in the present instance for the adjustment of the spring X, and F is a link connecting the shoe L to the diaphragm B. Q is a recorded phonographic tablet revolved around an axis U and advanced by any usual or suitable means against a tracing-stylus I. This stylus is carried by a lever D, fulcrumed at d upon a weight G, which is hinged at a fixed point P. A link S connects the lever D to the shoe L.

In Fig. 2 a cross-section of the roll C is shown as provided with flange-like projections T, which will be desirable in practice to guide the shoe L.

The operation of the device as thus constructed is as follows: When the roll C and tablet Q are revolved, the spring X being ad-

justed to hold the shoe L in contact with the roll C and to sustain the weight G, which rests upon the lever D and link S, the weight G will act to hold the stylus I in contact with tablet Q, even if the tablet be slightly out of round, while relatively to the rapidity of the inscribed vibrations corresponding to sound-waves upon the rotating tablet the weight G will act as a substantially fixed fulcrum for the lever D, a fact well known in the phonographic art. The vibrating energy imparted to the lever D by the rotating tablet Q will therefore be transmitted through the link S to the shoe L and impart corresponding vibration to the pressure exerted by the spring X upon the frictional contact of the shoe L with the roll C, whereby the frictional force exerted by the rotating roll C through the shoe L and link F against the diaphragm B will receive corresponding vibrations, as will be readily understood in view of the art as disclosed in my said Letters Patent of July 16, 1901. In the present constructional arrangement, however, an elastic means or spring X acts to force the shoe L in the direction of rotation of roll C, while the tensional link S, connected to the lever D, acts to hold back the movement of the shoe L in relation to the rotation of roll C, whereas in the construction illustrated in my said Letters Patent the lever means acted to force the shoe in the direction of rotation of the roll and the retractile action of the secondary vibrating means was depended upon to pull the shoe backward in relation to the direction of rotation of the roll. The advantage of my present construction is that the to-and-fro vibrating movement of shoe L, corresponding to sound-waves, will be more accurately effected, since the shoe L will not be so sluggish in its backward movement relatively to the direction of rotation of the roll C and not so apt to move too far in the direction of rotation of the roll C, as is liable to be the case when the frictional coefficient is high at the frictional contact of the shoe L with the roll C. The angle of push of the spring X for best results should lean backward from the radial line R, passing from the axis of the roll C through the connection of the spring X with the shoe L—that is to say, backward in relation to the direction of rotation of roll C.

It will be understood that modifications of the precise construction or arrangement of parts could be made without departing from the scope of my invention, and I shall therefore refer in the claims which follow to the rotating recorded tablet Q and stylus I, which set up vibrating energy, as "primary vibrating means," to the diaphragm B, which responds to vibrating energy, as "secondary vibrating means," to the rotating roll C and shoe L as "frictional means," to the lever D and link S as "lever means," and to the spring X as "elastic means."

I claim as my invention—

1. In a sound-reproducing apparatus, the combination of primary vibrating means and secondary vibrating means, and frictional means controlling said secondary vibrating means, with elastic means acting to increase the pressure at the frictional contact of said frictional means, and with lever means, controlled by said primary means, acting to re-

duce the pressure at the frictional contact of said frictional means, substantially as and for the purpose described.

2. In a sound-reproducing apparatus, the combination of primary vibrating means and secondary vibrating means, and frictional means controlling said secondary vibrating means, said frictional means comprising a rotating roll and a shoe in frictional contact therewith, with elastic means acting to push said shoe in the direction of rotation of said roll, and lever means controlled by said primary vibrating means acting to pull back the said shoe relatively to the direction of rotation of said roll, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

DANIEL HIGHAM.

Witnesses:

A. N. BONNEY,
B. W. WILLIAMS.

No. 713,209.

Patented Nov. 11, 1902.

T. A. EDISON.
PROCESS OF DUPLICATING PHONOGRAMS.

(Application filed Mar. 5, 1898.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1^e

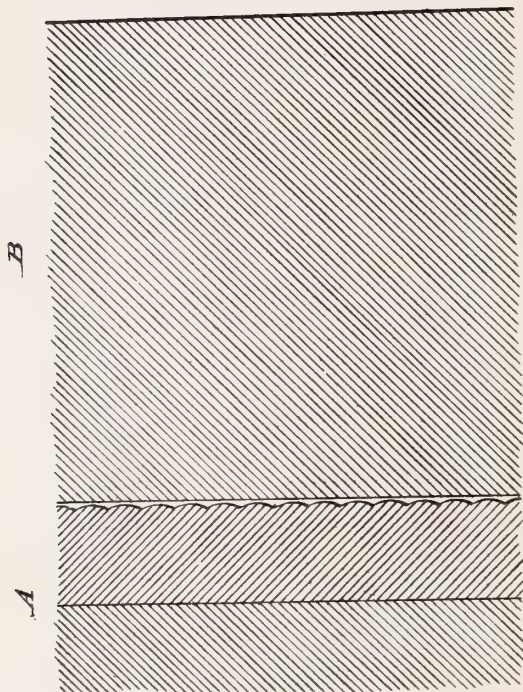
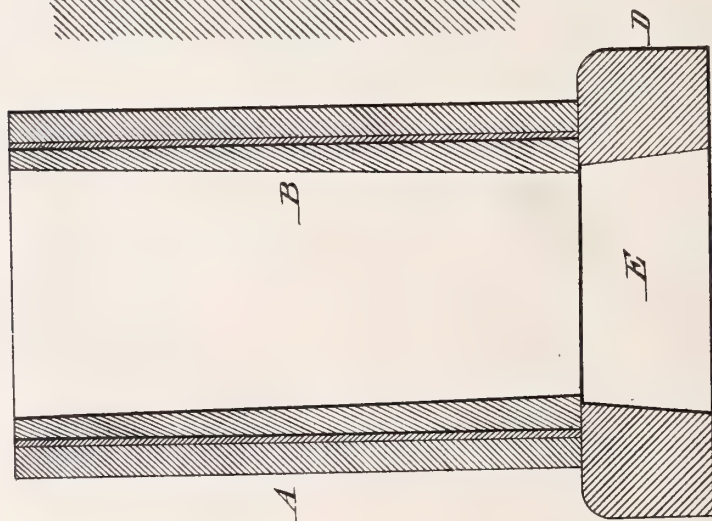


Fig. 1



Witnesses:

Geo. F. Creman

Geo. Robt Taylor

Inventor

Thomas A Edison

by Alfred Edwin Edwards

Att'ys.



No. 713,209.

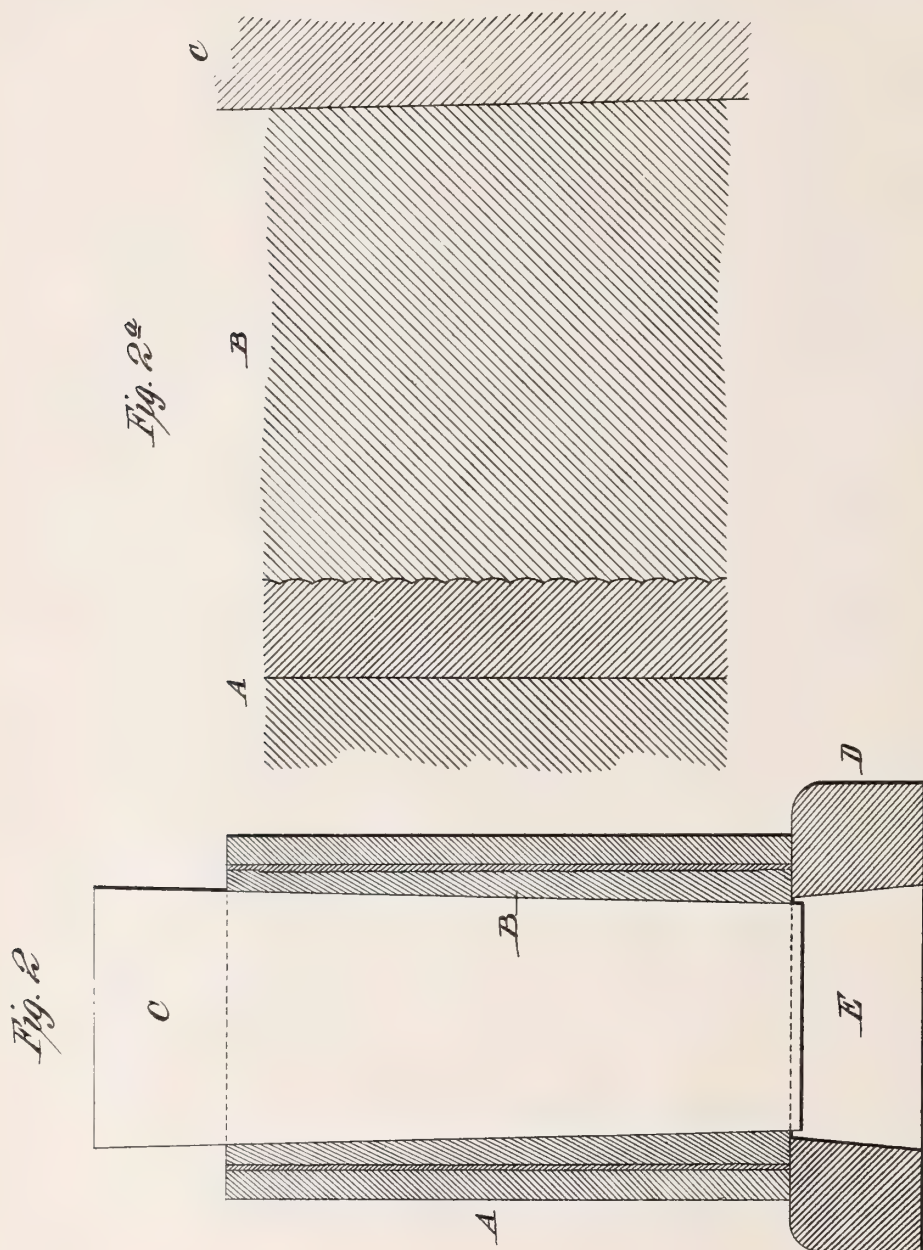
Patented Nov. 11, 1902.

T. A. EDISON.
PROCESS OF DUPLICATING PHONOGRAMS.

(Application filed Mar. 5, 1898.)

(No Model.)

3 Sheets—Sheet 2.



Witnesses:

Geo. F. Coleman
Geo. Robt Taylor

Inventor

Thomas A Edison
by Ayer Edmunds & Ayer
Att'ys.



No. 713,209.

Patented Nov. 11, 1902.

T. A. EDISON.
PROCESS OF DUPLICATING PHONOGRAMS.

(Application filed Mar. 5, 1898.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 3^a

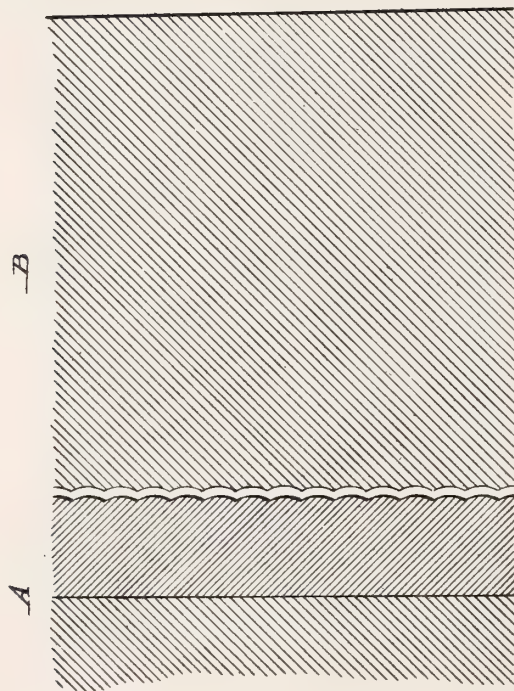
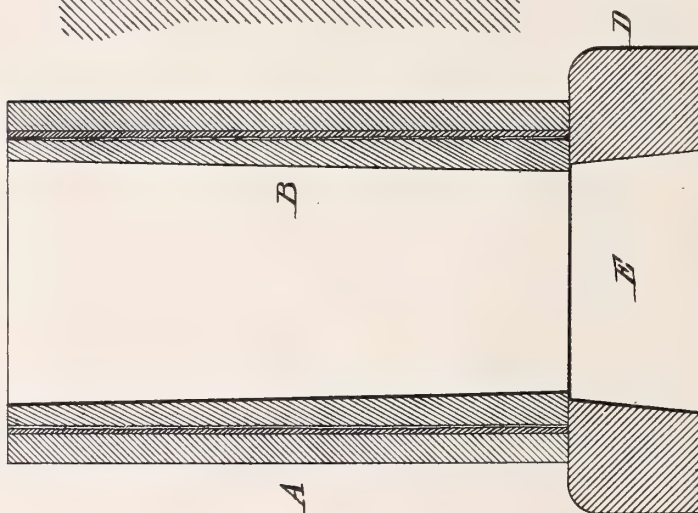


Fig. 3



Witnesses:

Jas. F. Coleman
Geo. Rott Taylor

Inventor

Thomas A. Edison
by Asper Edmunds & Asper
Att'ys.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

PROCESS OF DUPLICATING PHONOGRAMS.

SPECIFICATION forming part of Letters Patent No. 713,209, dated November 11, 1902.

Application filed March 5, 1898. Serial No. 672,650. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Processes of Duplicating Phonograms, (Case No. 994,) of which the following is a specification.

The object I have in view is to produce a practical process for the duplication of phonographic records, whereby a practically unlimited number of duplicate phonographic records may be obtained which will be absolutely identical in every respect with the original record. Generally I propose to construct a suitable matrix, preferably in metal, and by its use to impress duplicate phonograms with a phonographic record thereon, such phonograms being preferably constructed of a material having a greater coefficient of expansion than the material of the matrix or mold.

By my process the duplicate phonogram or the surface thereof may be and preferably is constructed of a material too hard for the satisfactory cutting of an original record therein by the usual phonographic recorder, whereby the duplicate phonograms may be made more durable than it is possible to make original records; but the duplicate phonograms may obviously be made of a softer material.

My improved process can be carried out for the reproduction of phonographic records of any desired form, either flat disks or hollow cylinders; but it has been specially devised for use in connection with the duplication of records of the latter type. For the duplication of cylindrical phonographic records from a tubular matrix my improved process also provides for the effective removal of the finished duplicate from the matrix without injury to the record-surface of the former.

In carrying my process into effect I first construct a matrix carrying a negative representation of the record, which matrix can be produced by any of the known processes—as, for example, those indicated in my Patent No. 484,582, dated October 18, 1892. As I explained in this patent, an original phonographic record having a surface of the usual wax-like material is first secured and its sur-

face coated with a coating of conducting material in order to permit the original record to be electroplated. This conducting coating can be and preferably is applied by a process of vacuous deposit, as I described in my Patent No. 527,147, dated September 18, 1894, by placing the record in a vacuum-chamber in which a metal is vaporized by an electric arc produced between electrodes of the metal, the metallic vapor depositing as a thin uniform coating on the original record. I prefer to apply a preliminary coating by a process of vacuous deposit, for the reason that the highly-comminuted condition of the vaporized metal permits the coating to form as a uniform film, following accurately all the variations of the record, however minute. Instead of coating the original record with a vaporized metal it may be coated with a very thin layer of specially-prepared plumbago of exceedingly-great fineness, or instead thereof gold-leaf or silver salts reduced by chemical reagents to the metallic state may be used for the same purpose. Having thus applied a very thin preliminary coating to the original record, the latter is immersed in an electroplating bath and electroplated with a metal to the desired thickness, thereby forming a shell inclosing the original record, which shell carries on its bore an accurate negative representation of that record. Preferably this shell is suitably incased in a close-fitting cylindrical jacket, although if the electroplating is carried on long enough to form an electroplated coating of sufficient thickness a jacket need not be used. The original record is removed from the electroplated matrix obtained as described either before or after the jacket, if used, is applied to the shell. This removal of the original record can be effected either by dissolving or melting the wax-like material (or by contracting the original record radially and removing it by a direct longitudinal movement.) In the case of cylindrical phonographic records the resulting matrix will be a hollow metal cylinder or tube or one internally faced with metal carrying the phonographic record in relief upon its inner surface.

While I have indicated convenient and well-known methods for producing the ma-

trix, it will be obvious that the matrix can be obtained in any other way familiar to those skilled in the art.

Having obtained a suitable matrix carrying
5 a negative representation of the original phonographic record to be duplicated, I proceed with the duplication of the records as follows: The blanks which are to receive the duplicate records are preferably composed of a material having a higher coefficient of expansion than that of the matrix or mold, and said blanks are made sufficiently thick to maintain their shape during and after the act of disengagement from the matrix, as will be explained. The blank under normal temperatures is of a diameter very slightly less than the bore of the matrix or mold, whereby the blank may be inserted in the same. After the blank has been thus placed within the
20 matrix or mold both the matrix and the blank contained therein are, or the blank alone is, brought to a higher temperature, whereby the blank will expand and will be brought into intimate contact with the record-surface of the matrix or mold, whereby the negative record thereof will be impressed with absolute accuracy upon the surface of the blank. The expansion of the blank into this intimate engagement with the interior of the matrix or mold may be effected in any suitable way, such as by maintaining the matrix or mold, with the blank contained therein, in a heated atmosphere. By making the blank of a material having a higher coefficient of expansion than the matrix or mold the blank will be properly expanded to receive the impression of the record, notwithstanding the fact that both the blank and the matrix or mold may be subjected to the same temperature.
40

In order to facilitate the operation and make the resulting duplicate record somewhat sharper, I prefer to introduce a tapering mandrel within the blank after the blank
45 has been placed in the matrix or mold and heat applied to the blank, as explained, and to force the mandrel tightly within the blank after the latter has been expanded into engagement with the record, whereby the blank
50 will be further expanded mechanically into absolute intimacy with the record, after which the mandrel will be immediately withdrawn. With blanks made of sufficiently viscous material the entire expansion may be effected mechanically by forcing a tapering mandrel within the same.
55

After the blank has been expanded, so as to receive the impression of the matrix or mold, it is removed by first shrinking it radially in any suitable way, as in a refrigerating-chamber, and by then withdrawing the resulting duplicate record by a direct longitudinal movement. Owing to the shallowness of the phonographic-record groove this radial shrinkage of the duplicate record effects a
65 sufficient separation of the surfaces of the

matrix and of the duplicate record to prevent injury to the surface of the duplicate record due to any longitudinal contraction thereof.

I find that by the process above described, and particularly when a matrix or mold is obtained by a process of vacuuous deposit, as explained, duplicate phonographic records can be obtained which will be accurate reproductions of the original records and be free from extraneous noises and wherein the quality and intensity of the original vibrations will be reproduced with absolute faithfulness. I find, moreover, that since by this process there is little or no wear upon the matrix or mold a practically unlimited number of duplicates may be obtained from a single matrix or mold.

The degree of heat necessary to properly expand the blank will depend largely upon the material of which the blank is formed and upon the closeness of fit of the blank when inserted within the matrix or mold. For the same reasons the extent of the reduction of temperature in chilling and shrinking the duplicate record will vary to a considerable extent.

The invention is illustrated in the accompanying drawings for convenience in connection with a cylindrical phonogram.

In the drawings, Figure 1 is a sectional view showing a matrix or mold with a blank introduced therein prior to the expansion of the blank into engagement with the record-surface of the matrix; Fig. 1^a, a section through a part of the walls of the blank and matrix very greatly enlarged; Fig. 2, a view similar to Fig. 1, showing the blank expanded into engagement with the matrix and illustrating also a tapered mandrel forced into the blank; Fig. 2^a, a view corresponding to Fig. 1^a, showing a part of the walls of the matrix, blank, and mandrel of Fig. 2, very greatly enlarged; Fig. 3, a view corresponding to Figs. 1 and 2 with the tapered mandrel removed and illustrating the formed duplicate as having been contracted radially preparatory to being removed from the blank by a direct longitudinal movement; and Fig. 3^a, a section, very greatly enlarged, corresponding to Figs. 1^a and 2^a and illustrating the relative relation between the duplicate and matrix prior to the removal of the former.

In the views corresponding parts are represented by the same letters of reference.

A represents the matrix or mold, carrying on its bore a negative representation of the record to be reproduced.

B represents the blank to be duplicated, which is preferably provided with a tapered bore, as is now common, and which is of sufficient thickness to maintain its shape during and after the act of disengagement from the matrix. This blank is turned down so that it may be inserted within the matrix or mold with a close fit, as shown in Figs. 1 and 1^a. The blank to be duplicated may be and prefer-

ing said "elastic"

ably is of a harder material than can be practically or satisfactorily engraved, indented, or cut by a phonographic recorder, whereby the duplicate phonographic records will be more durable than could be obtained in the first instance by the operation of a recording or indenting device actuated directly by the sound-waves. These blanks may therefore be made of a relatively hard material, such as asphalt, or of stearic acid or stearate of soda mixed with varying proportions of fine precipitates—such as chalk, slaked lime, or lamp-black—or waxes or resins may be used, such as sealing-wax or shellac mixed with fine precipitates, like chalk, or polished ebonite, vulcanized hard rubber, or celluloid may be used, or glue may be employed either alone or mixed with precipitates, such as chalk.

C, Figs. 2 and 2^a, represents a tapered mandrel, which may be inserted within the blank B.

D represents a support for the matrix or mold and for the blank within the same, said support having an opening E therein, whereby the mandrel C may be moved longitudinally within the blank.

In carrying out the process I first introduce the blank within the matrix with as close a fit as practical, as shown in Figs. 1 and 1^a, after which the mandrel C is inserted within the blank. These parts are then subjected to heat, such as by being maintained in a heated atmosphere, whereby the blank will, by reason of its greater coefficient of expansion than the matrix or mold, be expanded into intimate contact with the record-surface of the latter, and an impression of such record will be accurately received on the blank. When the blank has been thus expanded into engagement with the matrix or mold, the mandrel C is forced tightly within the blank, so as to further expand it mechanically, whereby the blank will be forced into absolute intimacy with the record, and an impression will be received on the blank which will be clear, sharp, and an absolutely faithful reproduction of the original record. After the mandrel has been forced within the blank it is immediately withdrawn, and the blank is then chilled in any suitable way, such as by placing the matrix, with the blank contained therein, in a refrigerating-chamber. In this way the blank or duplicate will shrink or contract radially, as shown in Figs. 3 and 3^a, sufficiently to be removed from the matrix or mold by a direct longitudinal movement. Owing to the extreme shallowness of the phonographic-record groove, a sufficient radial separation between the resulting duplicate and the matrix or mold will take place to prevent any longitudinal contraction of the duplicate from injuring the record-surface thereof.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of duplicating sound-records

that consists in impressing a plastic record-tablet against a suitable matrix by its own expansive force.

2. The method of producing hollow cylindrical phonograms, which consists in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram within said mold, releasing the phonogram from the mold by a radial contraction of the phonogram sufficient to entirely clear the surfaces, and removing the phonogram from the mold by direct longitudinal movement.

3. The method of producing hollow cylindrical phonograms which consists in obtaining a mold having a reverse phonogram-record on the inner wall of a cylindrical opening, forming a hollow cylindrical plastic phonogram within said mold, releasing the phonogram from the mold by a reduction in temperature sufficient to entirely clear the surfaces, and removing the phonogram from the mold by direct longitudinal movement.

4. The method of producing phonograph-cylinders which consists in placing within a hollow cylindrical record mold or matrix, a hollow cylindrical phonograph-blank of sufficient thickness to maintain its shape during and after its engagement with the matrix, outwardly expanding such blank against said matrix, disengaging the impressed record-cylinder from the matrix, and withdrawing said record-cylinder from the matrix by direct longitudinal movement.

5. The method of producing phonograms which consists in placing within a hollow cylindrical record-matrix a hollow cylindrical phonograph-blank of sufficient thickness to maintain its form under normal conditions, softening said blank by heat and expanding the same while heated so as to take the record from the matrix, shrinking the phonogram so made by change of temperature, and withdrawing the same from the matrix by direct longitudinal movement.

6. The method of producing phonograms which consists in placing within a hollow matrix a hollow body of plastic material, said body being a cylinder on its outer surface and having a tapering central longitudinal aperture, softening said body by heat and expanding it into the matrix by the longitudinal movement of a tapering plunger within the plastic body, shrinking the plastic material and withdrawing it from the matrix by direct longitudinal movement.

7. The process of duplicating phonograms having a phonographic record thereon, which consists in forming a matrix or mold wherein the original record will be reproduced in relief, in loosely engaging a blank phonogram with said matrix, and in finally intimately engaging the blank phonogram with said matrix or mold by changes in temperature, substantially as set forth.

8. The process of duplicating phonograms having a phonographic record thereon, which consists in depositing a metal on said phonogram to form a matrix or mold wherein the original record will be reproduced in relief, and in intimately engaging a blank phonogram with the said matrix or mold by a change in temperature, substantially as set forth.

9. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal on said phonogram to form a matrix or mold wherein the original record will be reproduced in relief, in inserting the continuous cylindrical blank to be reproduced within said matrix or mold, in expanding the blank into intimate engagement with the record in relief carried by the bore of said matrix or mold, the cylindrical blank being sufficiently thick to maintain its shape during and after the act of disengagement from the matrix, and finally removing the cylinder by direct longitudinal movement, substantially as set forth.

10. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal upon the original phonogram so as to form a matrix or mold, in inserting the blank to be reproduced within said matrix or mold, in expanding the blank into intimate engagement with the record in relief carried by the bore of said matrix or mold, in finally shrinking the blank to disengage it from the matrix or mold, the cylindrical blank being made sufficiently thick to maintain its shape during and after the act of disengagement from the matrix, and finally removing the cylinder by direct longitudinal movement, substantially as set forth.

11. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal on said phonogram to form a matrix or mold wherein the original record will be reproduced in relief, in inserting the blank to be reproduced within said matrix or mold, in heating the blank, whereby the same will be expanded into engagement with the record in relief carried by the bore of said matrix or mold, and in finally subjecting the expanded blank to pressure to more intimately engage it with said record, substantially as set forth.

12. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal on said phonogram to form a matrix or mold wherein the original record will be reproduced in relief, in inserting the blank to be reproduced within said matrix or mold, in heating the blank, whereby the same will be expanded into engagement with the record in relief carried by the bore of said matrix or mold, in subjecting the expanded blank to pressure to more intimately engage it with such record, and in finally chilling the blank to re-

move it from the matrix or mold, substantially as set forth.

13. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal upon the original phonogram to form a matrix or mold, in covering said matrix or mold with a metal backing, in introducing the continuous cylindrical phonogram to be reproduced within said matrix or mold, in expanding said phonogram into intimate engagement with the record in relief carried by the bore of said matrix or mold, the cylindrical blank being made sufficiently thick to maintain its shape during and after the act of disengagement from the matrix, and finally removing the cylinder by direct longitudinal movement, substantially as set forth.

14. The method of producing phonograms, which consists in securing a hollow metallic mold or shell containing the reverse record, placing in said mold an expansible blank sufficiently thick to maintain its shape during and after its removal from the mold, expanding both by heat, impressing the record in the blank, contracting the phonogram so made by the withdrawal of heat, and removing the phonogram from the mold by a direct longitudinal movement, substantially as set forth.

15. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing a metal upon the original phonogram so as to form a matrix or mold, in inserting within said matrix or mold a blank to be reproduced made of a material having a higher coefficient of expansion than said matrix or mold, and in heating the blank and matrix carried thereby, whereby the blank will be expanded into intimate engagement with the record in relief carried by the bore of said matrix or mold, substantially as set forth.

16. The process of duplicating cylindrical phonograms having a phonographic record thereon, which consists in depositing in a vacuum a metal vapor upon the original phonogram, electroplating a metal thereon so as to form a matrix or mold, in inserting the continuous cylindrical blank to be reproduced within said matrix or mold, in expanding the blank into intimate engagement with the record in relief carried by the bore of said matrix or mold, the cylindrical blank being made sufficiently thick to maintain its shape during and after the act of disengagement from the matrix, and finally removing the cylinder by direct longitudinal movement, substantially as set forth.

17. The method of producing record-cylinders for phonographs, which consists in first forming a record on a cylinder of wax or other relatively soft material, rendering the surface of the wax cylinder electrically conductive, and electrolytically depositing metal thereon forming a matrix, and then outwardly

expanding under pressure within the matrix a cylinder or tube of softened material sufficiently thick to maintain its shape during and after the act of disengagement from the
5 matrix, and finally removing the cylinder or tube by direct longitudinal movement.

18. The herein-described process of molding sound-records in celluloid, which consists of softening a celluloid tablet and then fore-

ing the same against a suitable matrix by its own expansive force, substantially as described.

This specification signed and witnessed this 21st day of February, 1898.

THOMAS A. EDISON.

Witnesses:

J. F. RANDOLPH,
RICHD. N. DYER.

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No. 713,328.

Patented Nov. 11, 1902.

G. A. MOORE.
PHONOGRAPHIC RECORD.

(Application filed Mar. 8, 1902.)

(No Model.)

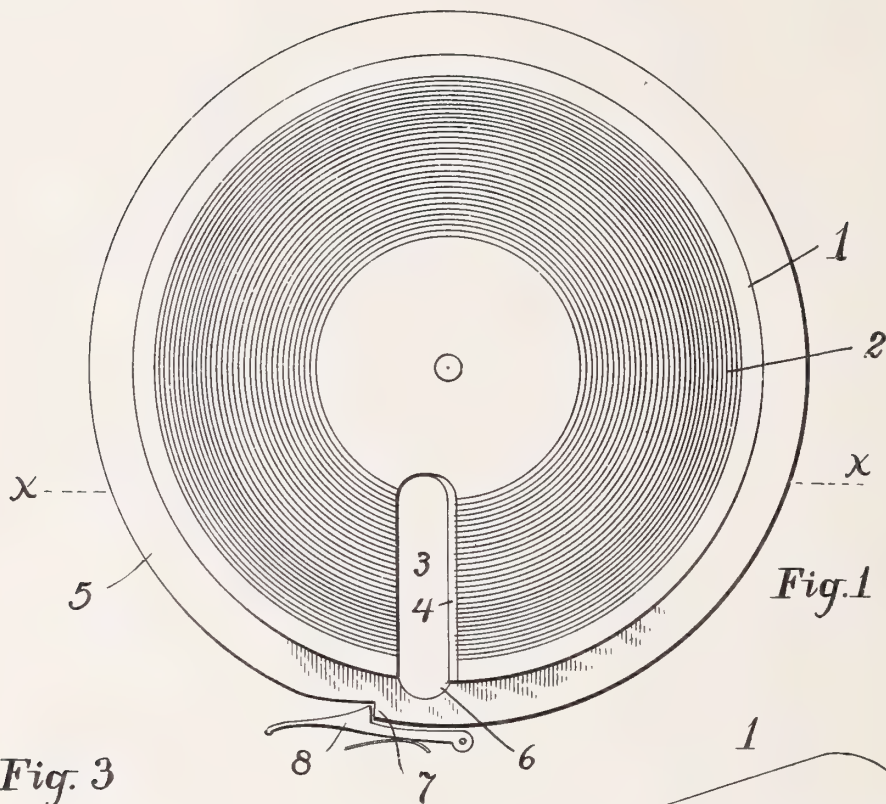


Fig. 3

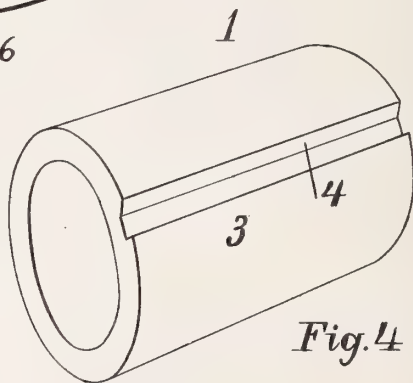
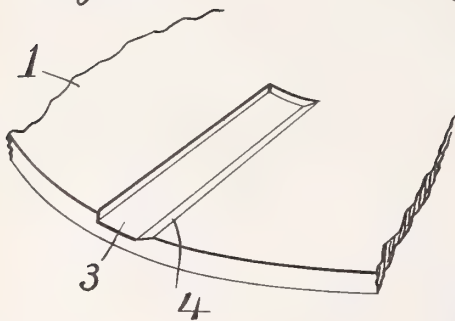


Fig. 4

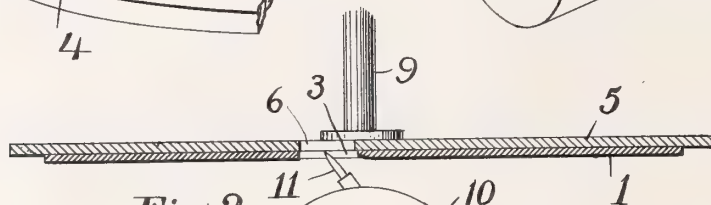


Fig. 2

Witnesses;

M. W. Upham.

George M. Warren

Inventor,

George A. Moore;

By A. B. Upham,
His Attorney.

UNITED STATES PATENT OFFICE.

GEORGE A. MOORE, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO THE
MOORE TALKING SCALE COMPANY, OF BOSTON, MASSACHUSETTS, A
CORPORATION OF MAINE.

PHONOGRAPHIC RECORD.

SPECIFICATION forming part of Letters Patent No. 713,328, dated November 11, 1902.

Application filed March 8, 1902. Serial No. 97,283. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. MOORE, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented a new and useful Phonographic Record, of which the following is a full, clear, and exact description.

The object of this invention is the construction of improved means whereby to automatically and vocally announce any one of a series of predetermined words or sentences—such as the weight of a person standing upon the platform of a weighing-machine, the height of some one standing beneath the bracket of a measuring apparatus, the “fortune” of any one touching any of a series of points upon a fortune-telling device, the want of a hotel guest, the different floors passed by an elevator, &c.

Referring to the drawings forming part of this specification; Figure 1 is a face view of a flat record having its record-grooves formed in concentric circles, such record being shown in position on its supporting-plate. Fig. 2 is a horizontal section of the same on the line X X in Fig. 1, a sounder-box being illustrated as coacting therewith. Fig. 3 is a perspective view, on an enlarged scale, of my record-disk, having its slot or transverse channel formed as a groove or depression, a part only of the record-disk being shown. Fig. 4 is a perspective view of a cylindrical record provided with my non-communicating annunciator-grooves and channel transverse thereto.

In said drawings the reference-numeral 1 designates my improved phonographic record, whether formed as a disk (shown in Fig. 1) or a cylinder, Fig. 4. Of these two forms that of the disk is far preferable, because of its facility of inexpensive and indefinite duplication from a single original.

As shown in Fig. 1, the disk 1 is formed with a large number of circular concentric, and hence non-communicating, record-grooves 2, said grooves being cut transversely by a slot or channel 3, which from the nature of such arrangement is radial in its relation to the disk. Said disk is affixed to the carrier-plate 5, which is mounted upon a suitable revoluble shaft 9. This disk is formed with

a notch 7, engaged by a detent 8, and so normally held with the channel 3 in a vertical position.

Carried by a vertically-movable rod 12 is a sounder-box 10, with its needle 11 resiliently projecting into the channel 3. Said needle being thus out of contact with the disk, the sounder-box can be freely moved up or down to present said needle to any one of the record-grooves 2. The needle being thus brought into the field of any designated record-groove and the detent 8 disengaged, the disk can be made to revolve, and so audibly announce whatever message is contained in such groove. At the completion of the revolution the notch 7 again meets the detent 8, and so brings the disk to rest, this invention being especially designed for automatic weighing-machines of the kind set forth in my companion application, Serial No. 76,850, wherein the sounder-box 10 is normally rigid with the platform and rises and falls with the latter whenever stepped thereon. Hence were there no channel 3 the sounder-needle would soon become injured and worn. By having the channel 3 and sounder 10 below the center of the disk the heavier the person standing on the platform the lower the sounder-box descends, and hence the heaviest weights are associated with the record-grooves of longest radius and length. Inasmuch as the names of the larger weights are expressed in more numerous words than the lighter—as “fifty,” “one hundred and ten,” “one hundred and seventy-five,” &c.—the record-grooves of greatest length are thereby appropriated for the weight-names of corresponding length.

These record-disks are preferably formed from hard rubber or similar materials, and are hence quite thin. This necessitates that the channel 3 be a slot cut entirely through the material in place of a mere depression. (Shown in Fig. 3.) To further insure the freedom of the sounder-needle from injurious contact, I prefer to form a corresponding slot 6 in the carrier-plate 5, as shown in Figs. 1 and 2.

To better direct the sounder-needle to a designated record-groove, I usually bevel the edge of the channel 3, which moves toward

the said needle, as shown at 4 in the drawings.

What I claim as my invention, and for which I desire Letters Patent, is as follows, to wit:

1. A phonographic record containing parallel record-grooves and a deep channel cutting said grooves transversely, for the purpose of providing space for the sounder-needle to be moved into position to be engaged with any of said grooves, substantially as described.

2. A phonographic record comprising a revoluble disk having the concentric record-grooves upon its flat face, and the radial slot cutting said record-grooves, substantially as described.

3. A phonographic record comprising a rev-

oluble body having parallel record-grooves therein, and a channel cutting transversely through the latter, one side of said channel being beveled substantially as described.

4. In a phonograph, the combination with a record-disk having a series of concentric record-grooves and a radial slot, of a revoluble plate carrying said disk and formed with a slot corresponding with the slot in said disk, substantially as described.

In testimony that I claim the foregoing invention I have hereunto set my hand this 28th day of February, 1902.

GEORGE A. MOORE.

Witnesses:

A. B. UPHAM,

CHAS. A. COUCH.

111
Barnes

No. 713,401.

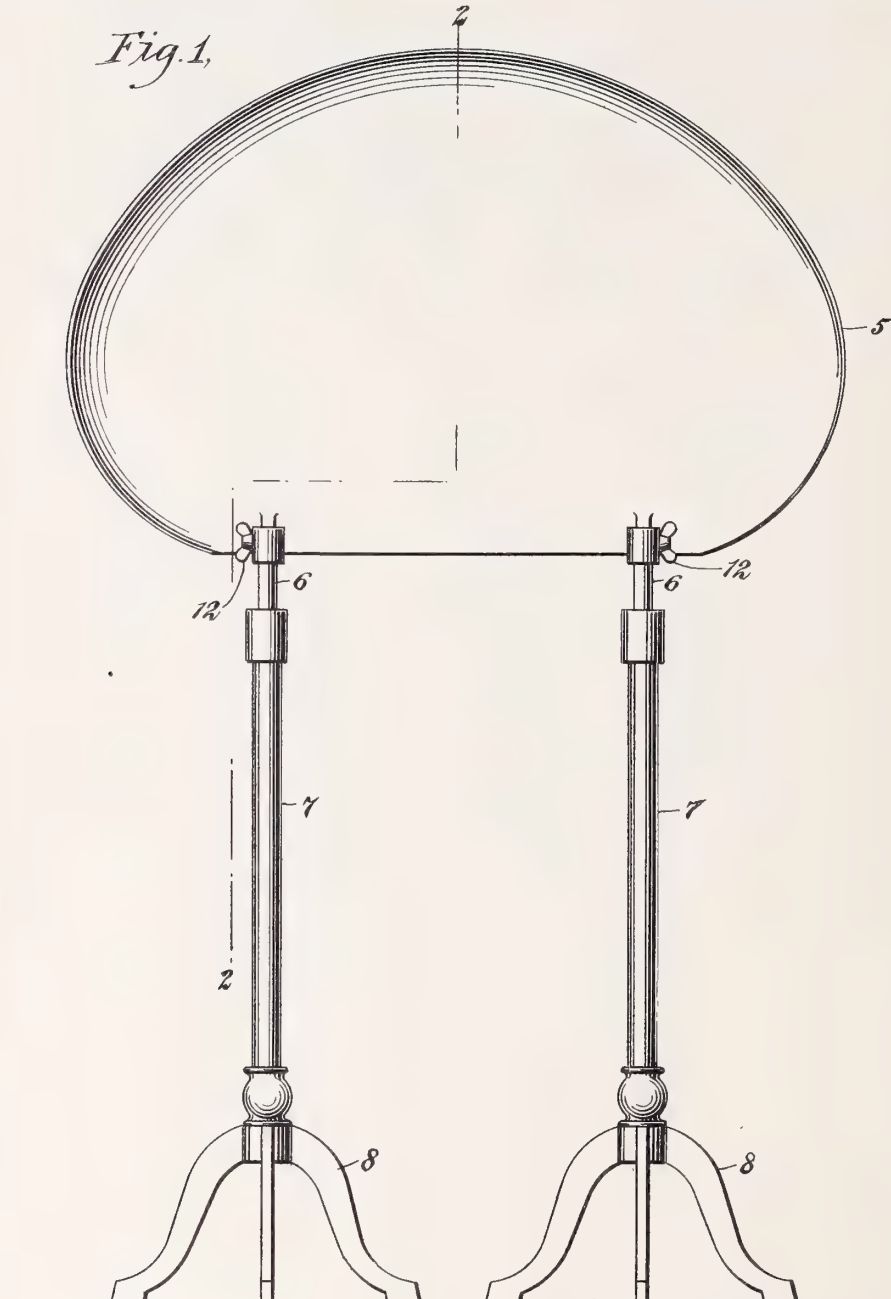
Patented Nov. 11, 1902.

S. W. CLARK.
SOUNDING BOARD.

(Application filed Apr. 22, 1902.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

Edward Thorpe
C. R. Ferguson

INVENTOR

Sarah Wood Clark

BY

Munn

ATTORNEYS.

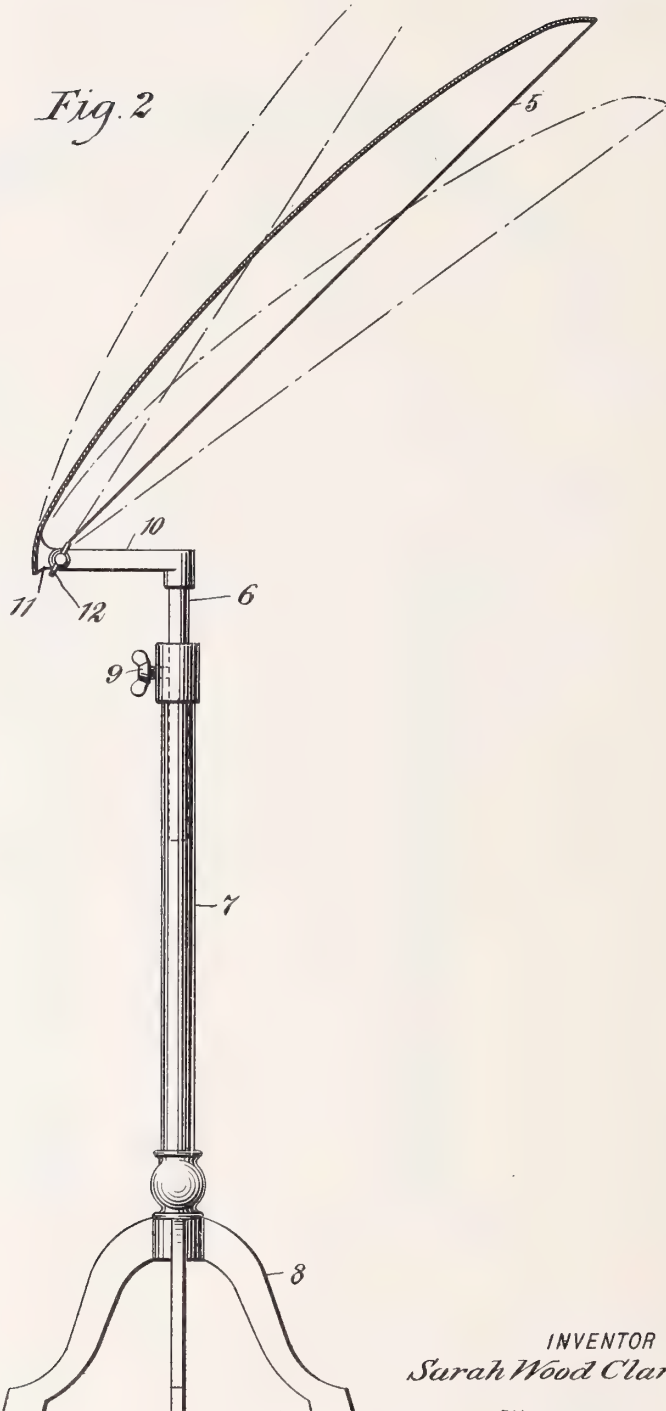
S. W. CLARK.
SOUNDING BOARD.

(Application filed Apr. 22, 1902.)

(No Model.)

2 Sheets—Sheet 2.

Fig. 2



WITNESSES:

Edw. Thorpe.
C. R. Ferguson

INVENTOR

Sarah Wood Clark

BY

Munn
ATTORNEYS.

UNITED STATES PATENT OFFICE.

SARAH WOOD CLARK, OF NEW YORK, N. Y.

SOUNDING-BOARD.

SPECIFICATION forming part of Letters Patent No. 713,401, dated November 11, 1902.

Application filed April 22, 1902. Serial No. 104,106. (No model.)

To all whom it may concern.

Be it known that I, SARAH WOOD CLARK, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Sounding-Board, of which the following is a full, clear, and exact description.

This invention relates to improvements in sounding-boards, particularly adapted for the use of violinists and other soloists playing with a piano or like accompaniment, the object being to provide a portable sounding-board that may be placed where desired to give the best effect in spreading or giving force and distance to the musical sounds.

I will describe a sounding-board embodying my invention and then point out the novel features in the appended claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in both the figures.

Figure 1 is a front elevation of a sounding-board embodying my invention, and Fig. 2 is a section on the line 2 2 of Fig. 1.

Referring to the drawings, 5 designates the sounding-board, which is concavo-convex or substantially shell-shaped and having a greater length than width. It may be made of any suitable material—such, for instance, as wood, metal, or the like—and it is sufficiently thin to properly vibrate upon receiving the musical sounds. The sounding-board is mounted on a suitable support, which, as here shown, consists of two legs, each leg consisting of telescopic members 6 7, the lower ends of the members 7 being provided with

feet 8. The member 6 is held as adjusted with relation to the member 7 by means of a set-screw 9, and on the upper end of each member 6 is a rearwardly-extending arm 10, having pivotal connection with a lug 11, arranged at the rear edge of the sounding-board. By this pivotal connection the board may be adjusted as to its angle and held in its adjusted position by a thumb-nut 12, engaging with the pivot-pin.

A sounding-board embodying my invention is very light, and therefore may be readily moved from place to place relatively to a piano or the like as desired, and as the several members may be separated one from another the whole device may be compactly folded for transportation.

As the board has a much greater length in a horizontal direction than its width, the greater volume of sound will be deflected laterally and forward.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

A sounding-board, supporting-legs therefor consisting of telescopic members, clamping-screws for the members, rearwardly-extended arms on the upper members, lugs on the rear edge of the board, pivot-pins passing through the lugs and arms, and thumb-nuts on the pins.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SARAH WOOD CLARK.

Witnesses:

JNO. M. RITTER,
C. R. FERGUSON.

1134

—

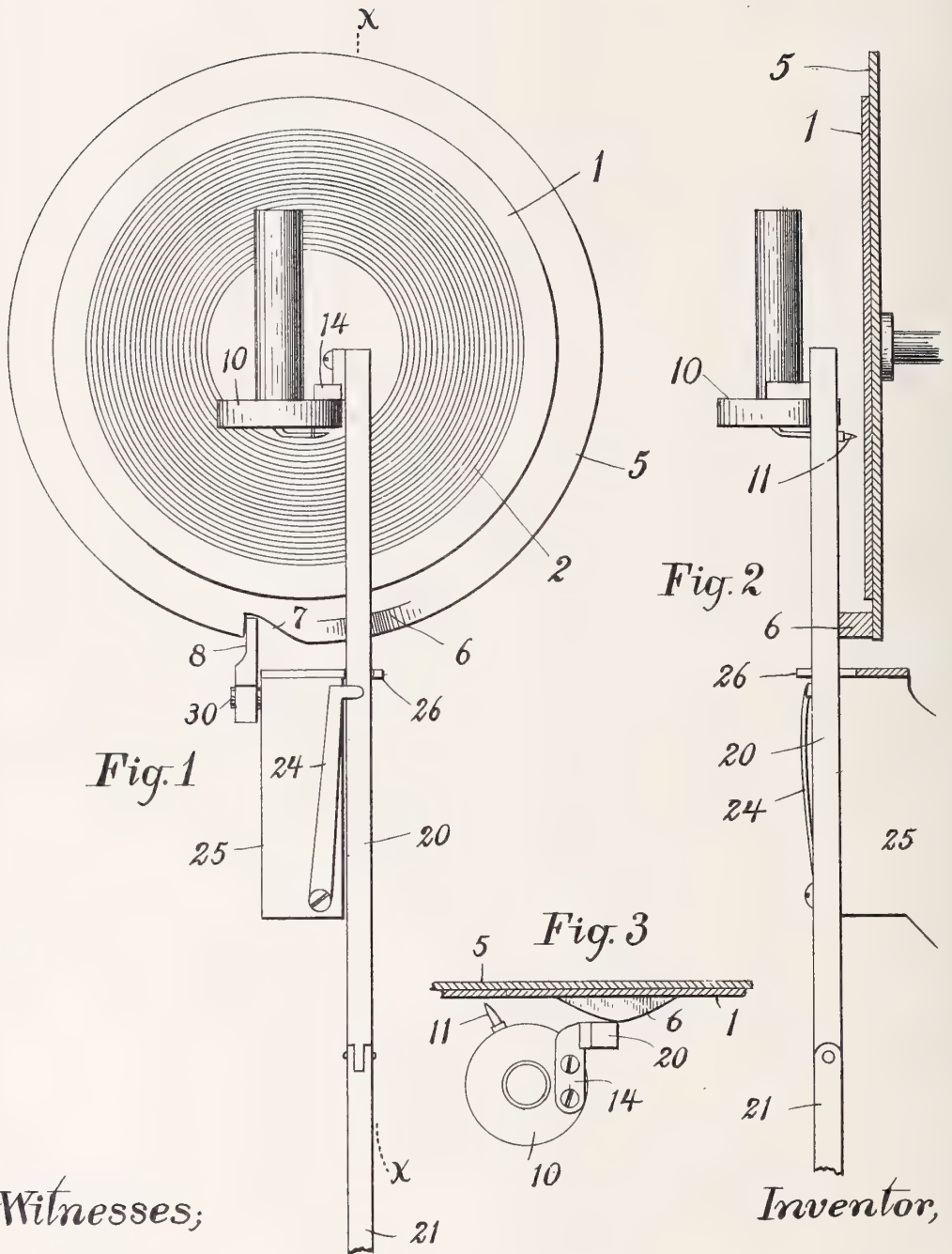
No. 713,477.

Patented Nov. 11, 1902.

G. A. MOORE.
PHONOGRAPH.

(Application filed Mar. 27, 1902.)

(No Model.)



Witnesses;
J. H. Waite.
E. H. Waite

Inventor,
George A. Moore;
By
A. B. Upham,
His Attorney.

UNITED STATES PATENT OFFICE.

GEORGE A. MOORE, OF BROOKLINE, MASSACHUSETTS.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 713,477, dated November 11, 1902.

Application filed March 27, 1902. Serial No. 100,158. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. MOORE, a citizen of the United States, and a resident of Brookline, in the county of Norfolk, State of Massachusetts, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact description.

In companion applications of mine, Serial Nos. 97,281 and 97,283, I have set forth means whereby any one of a selected number of statements can be audibly announced, the particular means comprising a phonographic record containing such statements in order thereon and a phonographic sounder adjustable to present its stylus to the particular record-groove desired. In the construction referred to the sounder is movable in a fixed line parallel with the record-face and presents the stylus to any record-groove without dragging its point over the grooves. The record is formed with a channel cutting the grooves transversely and is normally held with such channel beneath the stylus.

The object of my present invention is the construction of means whereby the stylus can be similarly prevented from dragging across the record-grooves, but without requiring the record to be formed with a stylus-receiving channel. My construction for this purpose consists, essentially, in having the sounder, while movable parallel with the record-face, to be resiliently pressed toward said face and then in providing the record with means for temporarily pressing the sounder, with its stylus, out of contact with the record-grooves upon the completion of each rotation of the record.

Referring to the drawings forming part of this specification, Figure 1 is a face view of a record-disk and sounder arranged in accordance with my invention. Fig. 2 is a sectional elevation of the same on the line X X in Fig. 1. Fig. 3 is a horizontal section of the same, but with the larger part of the record broken off.

While my invention can be applied to cylindrical records, I illustrate it in connection with a disk record 1, fixed upon a revoluble carrier-plate 5. In the face of this disk are the record-grooves 2, arranged in concentric circles and preferably containing a series of

weight expressions, as set forth in my said companion applications. Each record-groove therefore contains a single statement audibly announced by a single turn of the record when in engagement with the stylus 11 of the sounder 10. To normally retain the record-disk, with its record-groove starting-points, close to the stylus, the record-carrier 5 is formed with a notch 7, engaged by a detent 8. By depressing said detent the record-disk is permitted to revolve until said notch comes around and again is brought to rest by the detent.

Thus far described the construction is substantially the same as that set forth in my said companion applications, my present improvements being as follows: The rod 21 is connected with the platform of the weighing-machine upon which my invention is used and has a pivoted extension 20 rising from the upper end thereof. Said rod extension 20 is held from lateral displacement by a slot in the plate 26, carried by the fixed block 25, and is resiliently pressed back toward the disk 1 by the leaf-spring 24. The sounder 10 is rigidly secured to this rod extension by a suitable arm 14. Hence as the rod 21 rises and falls with the depressions of the weighing-machine platform the sounder is similarly reciprocated over the face of the record, while by moving the rod extension against the pressure of the spring 24 the sounder is withdrawn from contact with the record; otherwise the sounder-stylus remains pressed against the record-disk. To thus automatically disengage the sounder-stylus from the record when the latter is at rest and to permit such engagement when the record is rotating, I provide the carrier-plate 5 with a projection or boss 6, adapted to come behind the rod extension 20 when the notch 7 is in conjunction with the detent 8 and to thereby press said extension just far enough to hold the sounder-stylus out of possible contact with the record. Said boss being of limited extent and formed with sloping ends in the direction of the disk's periphery, the instant the record is released from the detent and begins to revolve the rod extension settles gradually back and presents the sounder-stylus to the record-groove in line therewith. As the record-disk completes its revolution

said boss comes again beneath said extension and raises the stylus away from all contact, as shown in Fig. 3. In this manner the sounder is perfectly free to rise and fall as
 5 people step on and off the weighing-machine platform; but the instant the record starts to turn after the introduction of a designated coin, as set forth in my said companion application Serial No. 97,281, then the sounder-
 10 stylus contacts with the record, and the weight is audibly announced.

Although I have described the boss 6 as formed upon the carrier-plate 5, it is evident that the same can be constructed on or fastened to the record-disk 1 itself, or a projection performing the functions of said boss
 15 can be carried to revolve with the record-disk and the carrier-plate without being actually secured to either; but I prefer the construction illustrated on account of its superior simplicity and economy of manufacture.
 20

What I claim as my invention, and for which I desire Letters Patent, is as follows, to wit:

25 1. The combination with a phonographic record, of a sounder resiliently pressed toward the face of said record but adjustable in a line parallel with the face of the latter, and means carried with said record constructed to press
 30 the sounder away therefrom at a designated point of each rotation of the record, substantially as described.

2. The combination with a phonographic record, of a sounder resiliently pressed toward
 35 the face of said record but adjustable in a line parallel with the face of the latter, and a boss carried with said record and pressing the sounder away from the record at a designated point of the latter's rotation, substantially as
 40 described.

3. The combination with a phonographic record, of a rod parallel with the face of the record and longitudinally movable, resilient means pressing the upper part of said rod to-

ward the face of the record, a sounder carried 45 upon the upper part of said rod and constructed to have its stylus normally contact with the record, and means carried with said record constructed to engage said rod and press
 50 the sounder away from the record at a designated point of the latter's rotation, substantially as described.

4. The combination with a record-disk, of a revoluble carrier-plate therefor having a boss upon its face near its periphery, a rod parallel with the face of the record-disk and longitudinally movable, resilient means pressing
 55 the upper part of said rod toward the record-disk, and a sounder carried upon the upper part of said rod and constructed to have its stylus normally contact with the record; said
 60 boss acting to engage said rod and press the sounder away from the record at a designated point of its rotation, substantially as described.
 65

5. The combination with a record-disk, of a revoluble carrier-plate therefor having the notch in its periphery and the boss near said notch, a detent engaging said notch, a longitudinally-movable rod having the pivoted rod
 70 extension parallel with the face of the record-disk, means resiliently pressing the upper part of said rod extension toward the record, and a sounder carried upon the upper part of
 75 said rod extension and having its stylus normally contacting with said record; said boss being constructed to engage said rod extension and press the sounder-stylus out of contact with the record-disk when said notch reaches said detent, substantially as described.
 80

In testimony that I claim the foregoing invention I have hereunto set my hand this 25th day of March, 1902.

GEORGE A. MOORE.

Witnesses:

LOWELL M. MAXHAM,
 A. B. UPHAM.



No. 713,592.

Patented Nov. 18, 1902.

W. VAN Z. P. BRADLEY.
SOUND BOX.

(Application filed June 27, 1902.)

(No Model.)

Fig. 1.

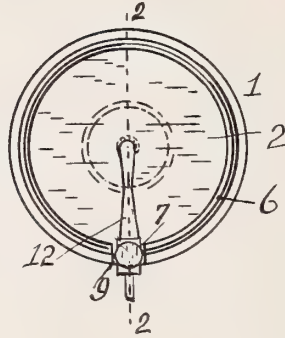


Fig. 2.

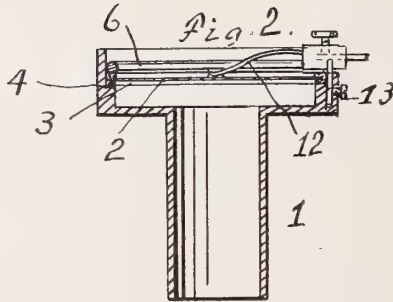


Fig. 3.

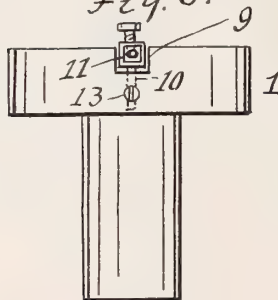
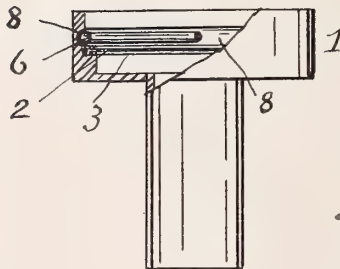


Fig. 4.



Witnesses

Ruf. R. Gordin
A. H. Olatun

Inventor

W. Van Z. P. Bradley
By Charles M. Cattin

Attorney

UNITED STATES PATENT OFFICE.

WINANT VAN ZANT PEARCE BRADLEY, OF TOLEDO, OHIO.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 713,592, dated November 18, 1902.

Application filed June 27, 1902. Serial No. 113,442. (No model.)

to all whom it may concern:

Be it known that I, WINANT VAN ZANT PEARCE BRADLEY, a resident of Toledo, in the county of Lucas and State of Ohio, have
5 invented certain new and useful Improvements in Sound-Boxes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it
10 pertains to make and use the same.

This invention relates to the part of talking-machines commonly called the "sound-box." The main object of the invention is to simplify and improve such sound-boxes.

15 In the drawings, Figure 1 is a plan view of the sound-box. Fig. 2 is a sectional view on line 2 2. Fig. 3 is a side view of the sound-box, and Fig. 4 is a partial section showing a modification.

20 1 indicates the sound-box; 2, the acoustic diaphragm, preferably of mica; 3, an elastic packing, as a rubber ring, around the edge of the diaphragm, the diaphragm and rubber ring fitting into the sound-box and resting
25 against shoulder 4. Within the sound-box outside of the diaphragm is a spring-wire ring 6, divided at one point, as at 7, and when in place is compressed, whereby it is given sufficient elasticity to hold it in place against the
30 diaphragm by the pressure of the spring against the smooth plain inner surface of the sound-box. It is not essential, however, that said inner surface be smooth or that it be plain. As shown in Fig. 2, said surface may
35 be provided with a depression 8, which will assist in holding the ring in place.

The rim of the sound-box is provided with a notch 9, extending nearly to the diaphragm. Supported in said notch by a pin 10 in a hole in
40 a wall of the box is a block 11, carrying the spring 12, which rests on the diaphragm at its center, preferably on a pellet of adhesive material. 13 is a screw for fastening pin 10 in any position to which it is adjusted. By ad-
45 justing said pin, and thereby the pressure of spring 12 on the diaphragm, the tone of the sound-box can be conveniently varied.

When inserting spring-ring 6, the division 7 is placed radially in line with the notch in

the sound-box. Hence it does not interfere 50 with the block 11, which block is provided with a hole to receive a reproducing-point and a fastening-screw therefor in well-known manner.

I am aware that a body carrying an operating-point having a part bearing on the center of the diaphragm and a part adapted to be secured to the sound-box on the outside thereof by a screw and elongated-slot connection has heretofore been proposed. My in- 60 vention, however, relates to my novel and useful improvements.

I claim—

1. The combination of a sound-box for talking-machines, said box having a rim, there being a notch in the rim, a reproducing-point-carrying body supported in the notch, a spring also carried by said body and pressing on the diaphragm, and a spring-ring in the box over the diaphragm to hold it, the spring-ring being divided at the part corresponding to the said notch in the rim. 65 70

2. The combination of a sound-box for talking-machines, a diaphragm therein, a reproducing-point-carrying body, a spring carried 75 by said body and pressing on the diaphragm, a pin extending from said body into a hole in the box, a lock-screw at an angle to the pin and adapted to lock the pin in any adjusted position, whereby the sound of the box may 80 be varied by such adjustment.

3. The combination of a sound-box for talking-machines, a diaphragm therein, a reproducing-point-carrying body, a spring carried 85 by said body and pressing on the diaphragm, a hole in the end of the sound-box, a pin extending from the rear side of said body inside of the periphery of the box and extending into said hole in the end of the box, and a lock-screw at an angle to the pin and adapted 90 to lock the pin in adjusted position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WINANT VAN ZANT PEARCE BRADLEY.

Witnesses:

CLEM V. WAGNER,
L. M. WILLIAMSON.





No. 713,722.

Patented Nov. 18, 1902.

L. P. VALIQUET.

CONNECTOR FOR HORNS AND SOUND BOXES OF TALKING MACHINES.

Application filed Mar. 26, 1902.

(No Model.)

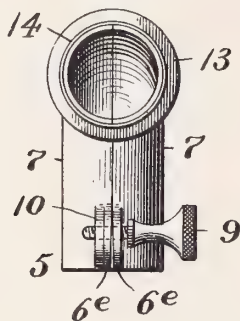
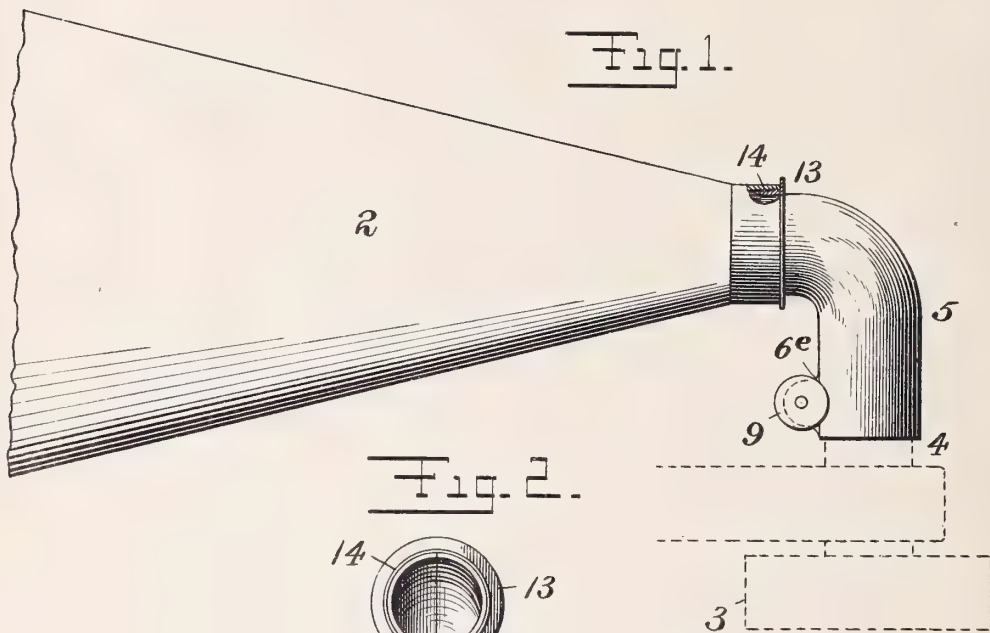


Fig. 3.

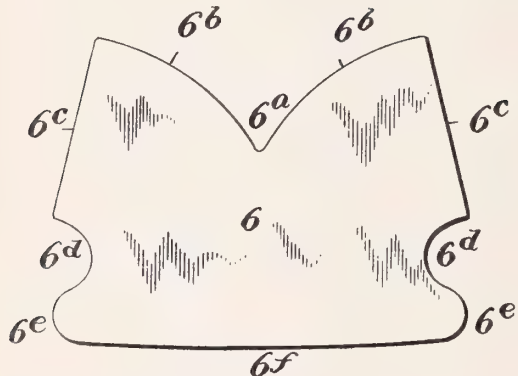
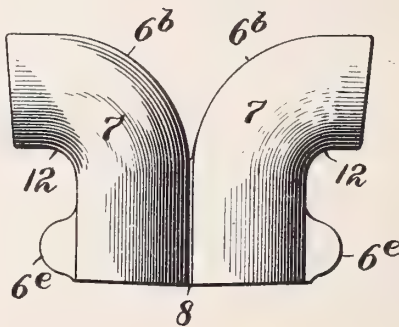


Fig. 4.



WITNESSES:

J. B. McGivver
John Conway Jr.

INVENTOR

Louis P. Valiquet
By H. A. West
Attorney

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO THE UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, OF NEW YORK, N. Y.

CONNECTOR FOR HORNS AND SOUND-BOXES OF TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 713,722, dated November 18, 1902.

Application filed March 26, 1902. Serial No. 100,045. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Connectors for the Horns and Sound-Boxes of Talking-Machines, of which the following is a specification.

Heretofore the connection of the horns of talking-machines with the sound-box has been by means of a sleeve of leather or other non-sonorous material of such nature that sound vibrations would not be emitted or transmitted to or from the sound-box. These connections are unstable, expensive, and difficult in the matter of making them to properly and uniformly fit the horn and neck of the sound-box.

The object of my invention is to provide a horn and sound-box connection or connector which shall possess the advantages of the leather connection and at the same time obviate its disadvantages; and to this end my invention consists in the metal horn and sound-box connector, as hereinafter described and claimed and in the special construction of the same.

In the accompanying drawings, to which reference is made and which form a part of this specification, Figure 1 is a plan view of a talking-machine horn and sound-box, showing my new connector applied thereto, a portion of the horn being broken away. Fig. 2 is a plan view of the connector. Fig. 3 shows, slightly enlarged, the metal blank for the connector as it comes from the blanking-die; and Fig. 4 is a plan view of the sections after the blank comes from the press or forming-die.

In the drawings, 2 designates the horn; 3, the sound-box, provided with a neck.

4 and 5 designate the connector.

The connector is formed of a metal blank 6, stamped out in a blanking-die in the form shown in Fig. 3, the same having the notch 6^a, the diverging curved edges 6^b 6^b, the opposite diagonal edges 6^c 6^c, the marginal indentations 6^d 6^d, the projections 6^e 6^e, and the main lower edge 6^f. The blank is then struck up in a forming-die into the shape shown in Fig. 4—that is to say, formed into the curved

and semicylindrical sections 7 7, united by the web 8, and each with a flat ear or lug 6^e, one of which is to be perforated, the other screw-tapped to receive the thumb-nut 9, as shown in Figs. 1 and 2. It is found expedient to reinforce one of the said lugs, the one which is screw-tapped, by a plate 10 to give the thumb-nut a firmer hold, and this is brazed or soldered to the outer surface of the screw-tapped end, as shown in Fig. 2.

The semicylindrical sections 7 7 are closed together, bending the web 8, and the edges 6^b 6^b brazed or soldered. Brazing or soldering is also applied to the edges 12 12 down to a point adjacent to the lugs 6^e 6^e, the remainder being left open to form flexible jaws to be relaxed and closed by the thumb-nut 9, the web 8 tending as a spring to open the jaws whenever the nut is relaxed or turned back. When so turned back, the neck 4 of the sound-box may be readily inserted, and by turning the thumb-nut bound firmly in place, so that no jar or rattle can take place.

The horn end of the connector is by preference finished with a collar 13, having a screw-threaded flange 14 to fit into the screw-threaded end of the horn, so that the connector can be readily attached and detached from the horn, enabling horns to be nested for shipment, the connectors being packed separately; but I do not limit myself to this construction, as the connectors may be permanently attached to the horn by soldering, or other means of attachment may be employed; nor do I limit myself to the use of a thumb-nut for binding the connector upon the neck of the sound-box, as other suitable fastening may be employed.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the sound-box and horn of a talking-machine, of a metal connector fastened at one end to the horn, and formed with a clamp at the other, and a fastening device applied to said clamp for binding the same upon the neck of the sound-box, substantially as described.

2. A horn and sound-box connector the same consisting of two curved and semicylindrical sections united by a web at one side,

finished at one end to connect with the horn, the sections being open opposite the web, and a fastening device for binding the sections upon the neck of the sound-box, substantially
5 as described.

3. A horn and sound-box connector formed with a screw-thread at one end and a clamp at the other combined with a fastening device for binding the clamp upon the neck of
10 the sound-box, substantially as described.

4. A blank for a horn and sound-box connector formed with the notch 6^a, curved edges

6^b 6^b, diagonal edges 6^c, 6^c, recesses 6^d 6^d, projections 6^e 6^e and edge 6^f, substantially as shown and described.

5. The curved and semicylindrical sections 7 7 each having a flat marginal end 6^e at one end, the straight portions of the sections being united by the web 8, substantially as and for the purposes set forth.

LOUIS P. VALIQUET.

Witnesses:

ADOLF SCHMINEKER,
W. H. PUMPHREY.



No. 713,863.

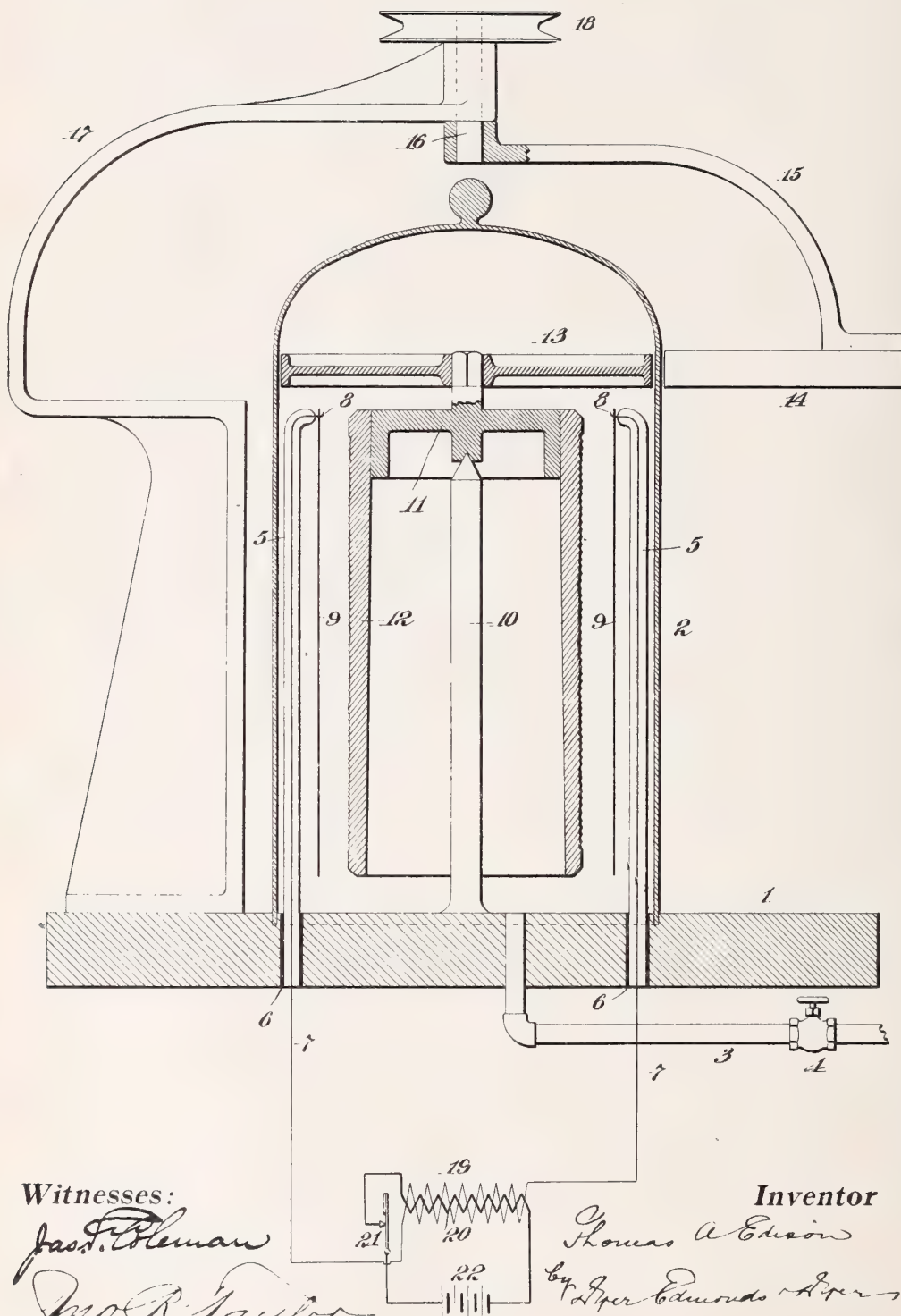
Patented Nov. 18, 1902.

T. A. EDISON.

PROCESS OF COATING PHONOGRAPH RECORDS.

(Application filed June 16, 1900.)

(No Model.)



Witnesses:

Geo. F. Pliman

Wm. R. Taylor

Inventor

Thomas A Edison

by Spencer Edmonds & Spencer

Att'ys.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

PROCESS OF COATING PHONOGRAPH-RECORDS.

SPECIFICATION forming part of Letters Patent No. 713,863, dated November 18, 1902.

Application filed June 16, 1900. Serial No. 20,555. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Process of Coating Phonograph-Records, (Case No. 1,038,) of which the following is a specification.

My invention relates to an improved process of the general type described by me in my Patent No. 526,147, dated September 18, 1894, my process being adapted for covering phonograph-records with an infinitesimally thin film of metal on which a heavier coating can be obtained by electrodeposition in order that a matrix or mold of the record can be secured for subsequent use in processes of duplicating such records.

The value of my process for the coating of phonograph-records resides in the fact that the deposited film is so minutely thin as to be accurately deposited upon all portions of the record, so that an absolutely accurate matrix or mold can be secured.

In my patent in question I describe a process of securing a metallic deposit upon any desired material, consisting in maintaining the material in an exhausted atmosphere and in securing the deposit by the formation of a practically continuous arc between two bodies of the metal of which the deposit is to be made, whereby said metal will be vaporized and the vapor deposited upon the desired material. I find in practice that the employment of an electric arc for vaporizing the metal, as suggested in my patent, is open to the objection of being slow, and unless the process is carried on with great care the deposit is not entirely uniform, while there is danger of injuring the very delicate phonographic-record surface, particularly from the heat of the arc. I find that the rapidity of the process is increased and the character of the deposit improved if the vaporization of the metal is effected by maintaining between two electrodes of the metal a silent discharge of electricity of high tension, such as may be produced from an induction-coil of large capacity or from any induction-machine of approved type, such as the Helmholtz induction-machine. The creation of a silent or practically silent discharge between two electrodes

results in the vaporization of the metal and its rapid and more direct deposit upon a phonograph-record supported between the electrodes than is the case in the patent. When a silent discharge is effected between the electrodes, the vaporized metal is carried by the discharge directly toward and upon the record to be coated. Instead of establishing a silent discharge between the electrodes a brush discharge may be maintained between them for securing the same result.

In effecting the coating of a metal upon the phonograph-record uniformity is secured by rotating the latter with respect to the electrodes. My present invention contemplates, therefore, the rotation of the record to be coated with respect to the electrodes in order that this result may be secured. Since the proper vaporization of the metal is effected only in the presence of a vacuum, preferably of high degree, I prefer in the carrying out of my process to effect the rotation of the record to be coated by a magnet movable exteriorly of the vacuum-chamber and attracting an armature connected to the object, and my present process in its preferred form contemplates such an operation.

In order that my process may be better understood, attention is directed to the accompanying drawing, forming part of this specification, and which shows an improved apparatus for carrying my process into effect.

1 represents a base, and 2 a vacuum chamber or jar, fitted with an air-tight joint upon the base.

3 is a pipe connected to the interior of the jar and by means of which air may be exhausted therefrom in any suitable way, as by an air-pump or by a Sprengel vacuum-pump, the latter being preferable, since a high vacuum is desirable in the operation. When the vacuum has been secured, it is retained by closing a valve 4 in the pipe 3 or by maintaining the vacuum-pump in constant operation.

5 5 represent two supporting-arms, made, preferably, of glass and leading up within the interior of the jar or vacuum-chamber, said supporting-arms being preferably further insulated from the base by means of hard-rubber insulating-bushings 6. A conductor 7 leads up within each of the support-

ing-arms and is formed with a hook 8 at its upper end. Suspended from each hook is an electrode 9 of the metal, preferably gold, to be deposited upon the record to be coated, such electrodes being preferably in the form of thin wires or strips of foil of such metal.

10 is a standard mounted between the electrodes and carrying a rotatable head 11 at its upper end, said head having a tapered periphery, from which is supported a phonograph-record 12, having a tapered bore, as is common. The record may be supported in any other way.

13 is an iron or steel armature carried by the rotatable head 11 and adapted to be attracted by a magnet 14, rotatable on the exterior of the vacuum-chamber. An ordinary horseshoe-magnet may be conveniently used for the purpose. I illustrate the magnet 14 as being supported by an arm 15 from a shaft 16, carried by a suitable bracket 17 and rotated by a pulley 18.

In operation a silent or brush discharge is established between the electrodes 9 in any suitable way—as, for example, by connecting the conductors 7 with the secondary of a large induction-coil 19, the primary 20 of which is included in a vibrator 21 and a source of current 22. The brush or silent discharge being established between the electrodes and the magnet 14 being rotated on the exterior of the vacuum-chamber to attract the armature 13, the record to be coated will be rotated between the electrodes, while the metal vaporized by the discharge will be deposited upon said record in the form of an infinitesimally thin and practically uniform film. When the phonograph-cylinder has been coated, it is removed and placed in a plating-bath, so as to receive a heavier deposit by a process of electrodeposition, after which the original record is removed, either by melting it out or by shrinking it from the deposited metal, whereby an absolutely accurate matrix or mold of the original record is secured.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of making a matrix or mold of a phonograph-record, which consists in maintaining the record in an exhausted chamber in proximity to an electrode of the metal of which the deposit is to be made, and in establishing a silent or brush electrical discharge between said electrode and a second electrode placed on the other side of the phonograph-record whereby the latter will be located between said electrodes, substantially as set forth.

2. The process of making a matrix or mold of a phonograph-record, which consists in maintaining the record in an exhausted cham-

ber between two electrodes of the metal of which the deposit is to be made, and establishing a silent or brush electrical discharge between said electrodes, substantially as set forth.

3. The process of making a matrix or mold of a phonograph-record, which consists in rotating the record in an exhausted chamber between two electrodes of the metal of which the coating is to be secured, and maintaining between said electrodes a silent or brush electrical discharge, substantially as set forth.

4. The process of making a matrix or mold of a phonograph-record, which consists in supporting the record in an exhausted chamber between two electrodes of the metal to be deposited, in establishing a silent or brush electrical discharge between said electrodes, and in rotating the record magnetically from the exterior of the chamber, substantially as set forth.

5. The process of making a matrix or mold of a phonograph-record, which consists in maintaining the record in an exhausted chamber in proximity to a metallic electrode, in establishing a silent or brush electrical discharge between said electrode and a second electrode placed on the other side of the record whereby the latter will receive a metallic deposit, then in electroplating on said metallic deposit, and finally in removing the original record from the matrix so secured, substantially as set forth.

6. The process of making a matrix or mold of a phonograph-record, which consists in maintaining a phonograph-record in an exhausted chamber between two metallic electrodes, establishing a silent or brush electrical discharge between said electrodes whereby a metallic coating will be deposited on the record, then in electroplating upon said metallic coating, and finally in removing the phonograph-record from the matrix so secured, substantially as set forth.

7. The process of making a matrix or mold of a phonograph-record, which consists in rotating a phonograph-record in an exhausted chamber between two metallic electrodes, in maintaining between said electrodes a silent or brush electrical discharge whereby a metallic coating will be deposited on said record, then in electroplating upon said metallic coating, and finally in removing the record from the matrix so secured, substantially as set forth.

This specification signed and witnessed this 15th day of May, 1900.

THOMAS A. EDISON.

Witnesses:

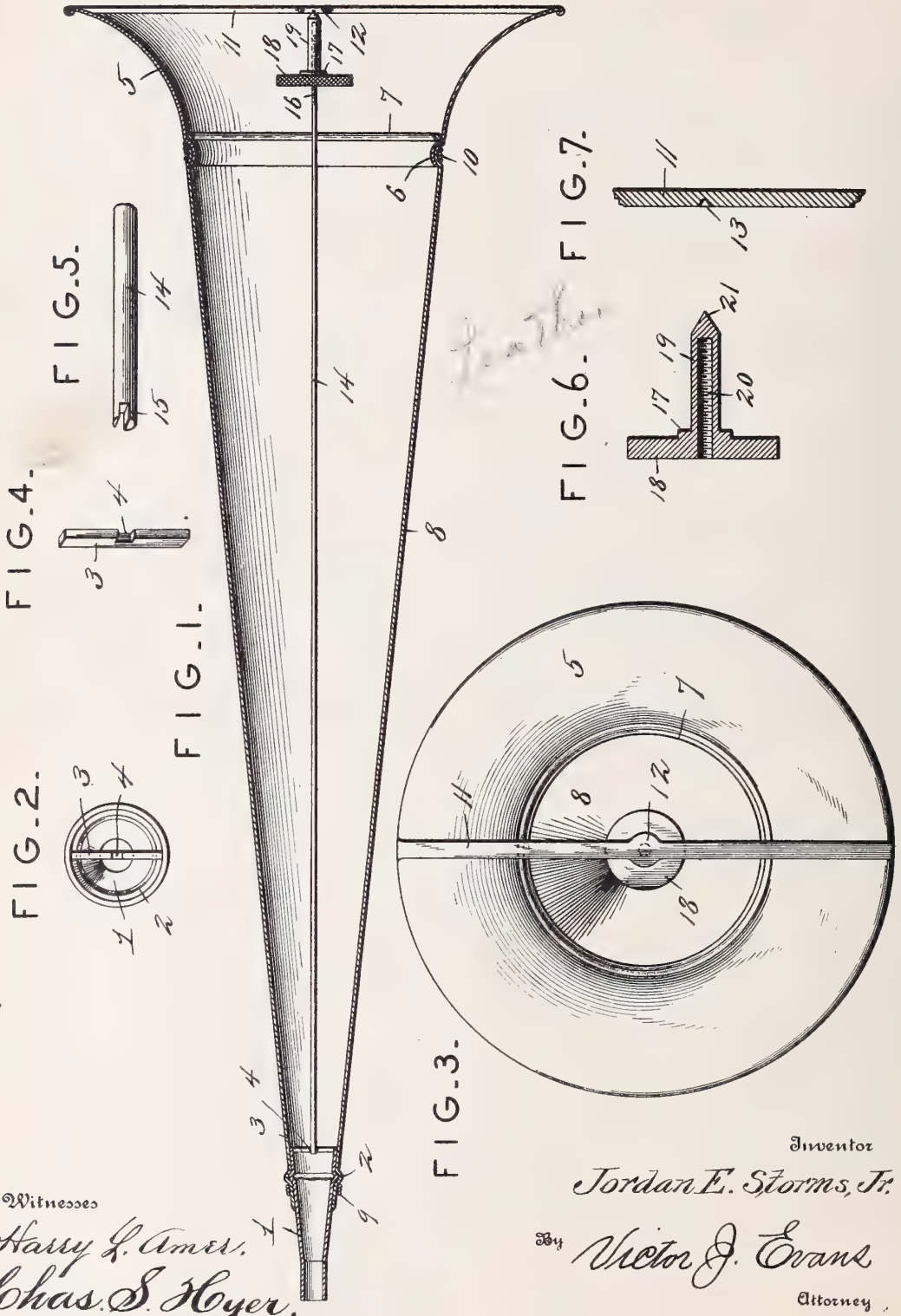
J. F. RANDOLPH,
W. MALLORY.

Handwritten text

J. E. STORMS, JR.
COLLAPSIBLE PHONOGRAPH HORN OR MEGAPHONE.

(Application filed Aug. 19, 1902.)

(No Model.)



Witnesses
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UNITED STATES PATENT OFFICE.

JORDAN E. STORMS, JR., OF YONKERS, NEW YORK.

COLLAPSIBLE PHONOGRAPH HORN OR MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 714,620, dated November 25, 1902.

Application filed August 19, 1902. Serial No. 120,240. (No model.)

To all whom it may concern:

Be it known that I, JORDAN E. STORMS, Jr., a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented new and useful Improvements in Collapsible Phonograph Horns or Megaphones, of which the following is a specification.

This invention relates to a collapsible phonograph horn and megaphone, and the purpose of the same is to provide a device of this class which may be reduced to compact form for convenience in transporting it from one place to another or for storing it when not in use and capable of ready distension or arrangement in shape for use.

The invention consists in the construction and arrangement of the several parts, which will be more fully hereinafter described and claimed.

In the drawings, Figure 1 is a longitudinal vertical section of a phonograph horn or megaphone embodying the features of the invention. Fig. 2 is a front end elevation of the rear end member of the improved device. Fig. 3 is a front elevation of the mouth or bell end of the horn or megaphone. Fig. 4 is a detail perspective view of a holding-bar carried by the rear end member of the device for engagement with the rear terminal of an expanding-rod. Fig. 5 is a detail perspective view of the rear extremity of the expanding-rod. Fig. 6 is a longitudinal vertical section of a tension-screw for the expanding-rod. Fig. 7 is a section through a brace carried by the mouth or bell end of the improved device, showing a socket therein for the reception of the point of the tension-screw.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The numeral 1 designates the rear end member, formed of metal and simulating in contour the attaching end of the ordinary phonograph-horn or the mouthpiece of a megaphone. This member 1 is formed with an outstruck circumferential bead 2 near the front end thereof, and extending diametrically across the said front end is a holding-bar 3, having a slot 4 in the center thereof opening out toward the front. The improved de-

vice also comprises a flared mouth or bell 5, formed of metal and having its rear terminal constructed with a circumferential groove 6, a strengthening-rib 7 being located in the mouth or bell 5 adjacent to the groove 6 and of circular form to stiffen the said mouth or bell and hold the latter in proper shape. The body 8 of the improved horn or megaphone is constructed of leather or other suitable material and shaped so that it will flare toward its front extremity. This body 8 is tubular, as will be readily understood, and the rear extremity thereof is drawn over the front end of the member 1 and secured to the latter by a winding 9, of cord or wire, applied over the rear extremity of the body in rear of the bead 2. The front end of the body 8 is secured to the mouth or bell 5 by a winding 10, of cord or wire, applied thereover and forcing it into the groove 6, and the parts are so proportioned that the body 8, together with the member 1, may be collapsed and pressed into and held by the mouth or bell 5.

Extending diametrically across the front of the mouth or bell 5 is a brace-bar 11, having a central enlargement 12 with a socket 13 in the rear thereof, as clearly shown by Fig. 7, the said brace-bar acting to stiffen the mouth or bell 5, and also has an engaging means for an expanding device to hold the improved horn or megaphone distended and in shape while in use. The expanding device consists of a rod 14, having a slot 15 in its rear end, as clearly shown by Fig. 5, to fit in the central slot 4 of the holding-bar 3. The front extremity of the expanding-rod 14 is formed with screw-threads 16, and adjustably mounted on the said front end of the expanding-rod is a tension-screw 17, having a rear head 18 with a milled edge, from which a center projection 19 extends forwardly. The projection 19 has a longitudinally-screw-threaded socket 20 formed therein, which also passes through the center of the head 18, and the front end of the said projection 19 is tapered to form a point 21 to engage the socket 13 in the center of the brace-bar 11.

In applying the rod 14 to distend the horn or megaphone the rear slotted end thereof is fitted to the bar 3, the tension-screw 17 being turned far enough rearward on the rod to be

clear of the brace-bar 11. The said tension-screw is then adjusted on the bar to bring the point 21 of the projection 19 in firm engagement with the socket 13, and by adjusting the screw 17 the tension exerted on the body 8 may be regulated. The rod 14 when applied as set forth and shown by Fig. 1 gives the improved device sufficient rigidity to cause it to remain in proper shape during use; but when it is desired to dispense with the use of the device the tension-screw 17 is run backwardly on the rod 14 and the latter detached and drawn outwardly from the body and mouth or bell. The body 8, as well as the member 1, can then be collapsed and pressed into the mouth or bell, and thus reduce the improved horn or megaphone to a small compass for convenience in storage or transportation.

It is obvious that changes in the proportions, dimensions, and minor details may be resorted to without in the least departing from the principle of the invention.

Having thus fully described the invention, what is claimed as new is—

1. In a device of the class set forth, the combination of a rear end member, a bell, a collapsible body terminally connected to said member and bell, and means removably extending longitudinally through the body and bell and engaging the rear member for holding said body distended.

2. In a device of the class set forth, the combination of a rigid bell and rear member, a collapsible body connected to the said bell and member, and an expanding-rod longitudinally

disposed in the said body and engaging a portion of the bell.

3. In a device of the class set forth, the combination of a rigid bell and rear member, a collapsible body connected to said bell and member, an expanding-rod extending through the body and a portion of the bell, and a tension-screw on the front extremity of the rod for engaging a part of the bell.

4. In a device of the class set forth, the combination of a rear attaching member, a bell, the member and bell being rigid, a collapsible body connected to said member and bell, and expanding means removably mounted within the body and bell and engaging the attaching member.

5. In a device of the class set forth, the combination of an attaching member having a holding-bar extending across its front end, a bell with a front diametrically-disposed brace having a central socket, a collapsible body connected to the attaching member and bell, an expanding-rod having a rear slotted end and a front screw-threaded extremity, and a tension-screw adjustably mounted on the front end of the expanding-rod and formed with a forward projection terminating in a point to engage the said socket, the rear end of the rod removably engaging the holding-bar of the attaching member.

In testimony whereof I affix my signature in presence of two witnesses.

JORDAN E. STORMS, JR.

Witnesses:

JOHN J. LENIHAN,
H. ALEX. HARTUNG.

11761

No. 714,651.

Patented Nov. 25, 1902.

T. H. MACDONALD.
RECORDING AND REPRODUCING SOUNDS.

(Application filed Dec. 5, 1898.)

(No Model.)

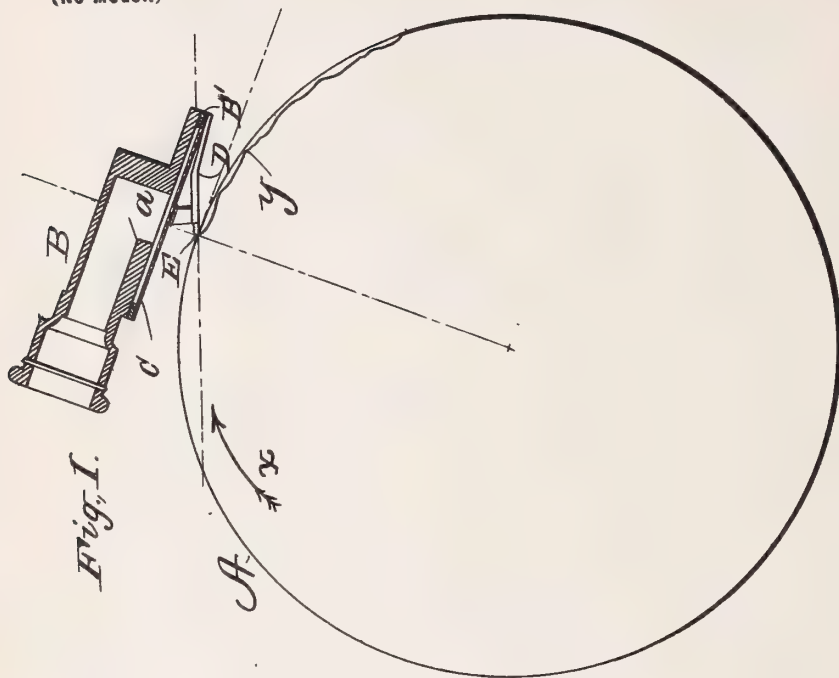


Fig. 1.

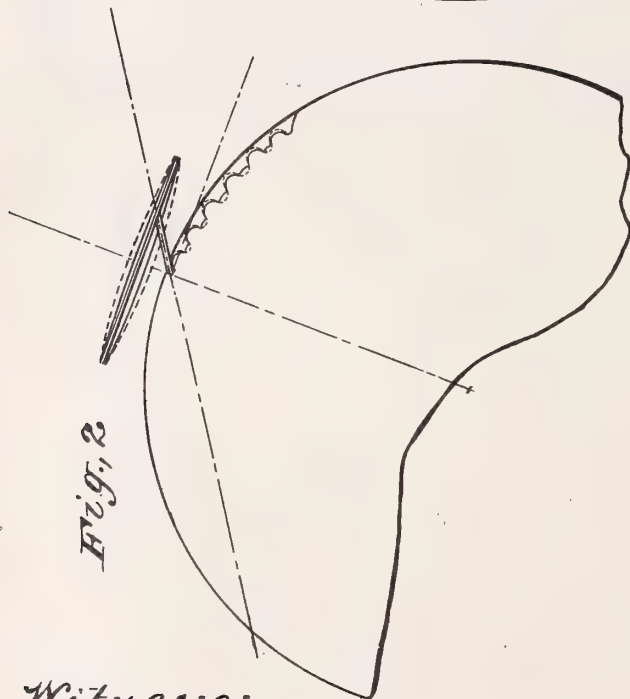


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
THE AMERICAN GRAPHOPHONE COMPANY, A CORPORATION OF WEST
VIRGINIA.

RECORDING AND REPRODUCING SOUNDS.

SPECIFICATION forming part of Letters Patent No. 714,651, dated November 25, 1902.

Application filed December 5, 1898. Serial No. 698,328. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, of Bridgeport, Connecticut, have invented a new and useful Improvement in Recording and Reproducing Sounds, which invention is fully set forth in the following specification.

This invention relates to the art of recording and reproducing sounds; and its object is to obtain complete and accurate records and reproductions of articulate speech and of all other sounds practically the same in volume and tone color or quality as the original sounds.

It has long been realized by those skilled in the art that the best reproductions of sound obtained by the method patented by Bell and Tainter in 1886 and now in general use, besides being very small in volume compared with the original sounds, differed therefrom in character to a greater or less degree. These differences have been recognized as of two principal sorts: first, the absence of components characterizing the original sounds, (especially noticeable in closed sounds, aspirates, sibilants, and high-pitched sounds,) and, second, the presence of foreign sounds or characters. The latter difficulty has been attributed to various causes, generally to so-called "false" vibrations; but after every effort to overcome these difficulties and to eliminate false vibrations the characteristic differences stated above distinguishing the reproduced from the original sounds still remained very strongly marked.

The complete result of sound reproduction involves two operations: first, the making of the record, and, second, the reproducing of the recorded sound. The theoretical object is to cause the reproducing-diaphragm or vibratory member to copy exactly the movements of the recording-diaphragm. If this be done with mathematical exactness, the reproduced sound will be identical with the original. Failure to attain this result may obviously be due either to failure of the recording-style to make a groove which is an exact graphic representation of the sonorous vibrations or to a failure of the reproducing-style to follow exactly all the irregularities

of the groove, so as to perform all the movements corresponding thereto and none other. The imperfection of the results hitherto attained is due, in fact, to both these causes; and the purpose of this invention, briefly stated, is to obtain accurate and complete representations in the form of a sound-groove of all sonorous vibrations and to cause the reproducing-diaphragm to vibrate strictly in accordance with said record, and thus copy in amplitude and character the motions of the recording-diaphragm.

It is difficult to make a close and accurate observation of what actually takes place in recording and reproducing sounds, because the movements, although of very complex character, are seldom more than one two-thousandths of an inch in amplitude and are at the rate of hundreds of complete vibrations to the second. By the aid of theory and careful microscopical investigations it has been possible to determine these operations with precision.

In making a record an important factor is the resistance of the recording medium to the movements of the style. To obtain the utmost freedom for the movements of the style and the maximum cutting effect, the axis of the style should be placed at as small an angle as practicable with the tangent of the cylindrical tablet (when that form is employed) at the point of contact, the smaller this angle the smaller being the resistance of the material to the cutting edge of the style. In practice the best results have heretofore been obtained when this angle is somewhat less than thirty-five degrees, it not being practical to make it much less. Under these conditions what occurs is that when the style begins to move into the recording material to cut a depression the heel of the cutter—that is, the portion behind the cutting edge—comes into contact with the crest that is being formed and checks the penetration of the style. Obviously the more the style is inclined toward the tangent the more effective is the check thus imposed on the movement of the style. Consequently the style will begin to descend in accordance with the characteristic acoustic vibration at the instant impressed on the diaphragm, but

will begin to depart from the characteristic movement as soon as the checking influence is felt, and will depart from it altogether as soon as the resistance overcomes the force of the vibration, which is exceedingly feeble. A further consequence follows from the fact that the vibration of the diaphragm is pendulous in character and, like the strings of a musical instrument, when perfectly unrestrained moves in a full vibration the same distance to one side as to the other of its normal position; but, again, like the strings of an instrument, the diaphragm if checked or damped on one side of the medial line will be unable to perform its proper movement, either in amplitude or character, on the other side of that line. Consequently from the cause above stated the ascending as well as the descending movement of the style is altered from what it would be if perfectly free to follow the movements of the air particles acting on the diaphragm. The departures are of course more strongly marked as the complexity of the sound increases, being least noticeable with a simple rhythmical vibration like that of a tuning-fork. The record thus produced will accordingly correspond at parts more or less closely to the form of the sonorous vibrations and at other parts will cease to correspond, and these corresponding and diverse parts will alternate at short intervals, so that a general correspondence to the more prominent features of the sound will be preserved. The record thus produced, studied microscopically, is characterized by short abrupt curves and crests or elevations close together. Necessarily even if the reproducing-style could be caused to follow such a record with perfect accuracy the reproduced sound would not correspond either in volume or character with the original; but at this point another difficulty appears. The end of the rubbing reproducing-style must have a certain minimum diameter and an approximately spherical curvature in order that it may not injure the record. Such a style cannot enter into all the depressions of the record, and, furthermore, the abruptness of the cam-like action of the successive elevations imparts a blow rather than a gradual controlled movement to the stylus, which often throws it off the record, some material portion of which passes before the stylus again makes contact with it.

Another and in some respects more serious defect existing to a greater or less degree in all sound-records heretofore made is that they do not embody an accurate record of the more minute vibrations, which give to sounds their tone color or quality. These vibrations are exceedingly feeble, and the resistance offered by the record material to the recording-stylus, together with the other causes above referred to as modifying the record of the more prominent sonorous vibrations, frequently overcome the minute vibrations men-

tioned, so that they are not recorded at all, or, if recorded, they become much modified.

The present invention involves a principle which may be briefly stated as follows: The speed imparted to the record-tablet should be such that the crest of each undulation moves from under the recording-style so rapidly that the heel of the latter at no time makes contact with the recording material and that the diaphragm is free to give its full sweep.

The invention therefore consists, primarily, in imparting to the tablet during the recording operation a surface speed which will secure the result stated above. It has been found that a surface speed of about forty-four meters per minute will secure the desired operation. After this speed is attained (which is from two and one-half to three times that ordinarily employed) further increases in speed produce no material improvement in the record.

With a cylindrical recording-style the position of the heel of the style will be determined by the angle which the axis of the style forms with the plane of the recording-surface, (or to the tangent, if it be a cylinder,) and I shall hereinafter refer to the angle which the axis of the style forms with said recording-surface or with said tangent as determining the position of the heel and cutting edge of the style; but it is to be understood that in so doing I do not limit myself to a cylindrical style, as a wedge or other shaped style may be advantageously employed, in which case the angle which the heel of the style forms with the surface of a flat tablet or the tangent of a cylindrical tablet will determine its position.

The record made by this process compared with one made at the same time by the ordinary process shows peculiar and distinguishing structural features. The two, in fact, differ very widely in appearance. The main features of difference are, first, in the new record the amplitude of the vibrations is much greater than that of the corresponding vibrations of the old record, showing the extent to which in the latter the movements of the style were checked; second, in the new record the undulations correspond throughout with the form of the sound-waves, the record presenting a continuous correspondence instead of a discontinuous or partial correspondence; third, the new record contains clearly defined characters, representative of tone color or quality, which are either wholly absent from the old record or not recorded in such a way as to be capable of acting upon its reproducer; fourth, the undulations of the new record are gradual easy curves, very different in appearance from the sharp angles and short abrupt curves of the ordinary record of commerce. These marked structural peculiarities of the new record can be quite plainly detected visually by the aid of a microscope. Their result acoustically is that the sound de-

livered by the new record has many times the volume of the sound delivered by the old record and corresponds closely in all its characteristics with the original sound.

5 The present invention comprises the new method of recording sounds herein described and the new sound-record produced by that method.

10 Figure 1 of the accompanying drawings shows a recorder with the cutting edge of its stylus embedded in the surface of a cylindrical tablet, the axis of the stylus being at an angle of about twenty degrees with a tangent of the cylinder at the point of contact.

15 Fig. 2 is a diagrammatic view showing the manner in which the vibrations of the recording-diaphragm are damped in the method heretofore employed by reason of the undulations contacting with the heel of the stylus.

20 Figs. 3 and 4 are views of the undulations in the bottom of a record made by the method of the present invention as the same are seen under the microscope. Figs. 5 and 6 are views of the undulations in the bottom of a record 25 made by the old method as seen under the microscope.

The undulations in Figs. 3 and 5 and in Figs. 4 and 6, respectively, are from the same sound recorded at the same time and magnified the same number of diameters.

30 Referring to Fig. 1, A represents a suitable record-tablet mounted to revolve in the direction indicated by the arrow *x*, and B is a recorder having its cutting-style E embedded in the tablet in the act of forming the record-undulations *y*.

35 In making sound-records according to the method of the present invention the point of the recording-style is slightly embedded in the surface of the tablet and the latter revolved at a high surface speed such as to leave the diaphragm perfectly free to give its full vibration in response to sonorous vibrations impinging thereon without any contact between the crests of the undulations and the 40 heel of the cutting-style. Obviously the rate of surface speed for the tablet which is necessary to accomplish this result will depend to a certain extent at least upon the angle of the recording-style with the surface of the tablet. The invention may be practiced with a flat or a cylindrical tablet, as desired, and when the latter form is employed the style is preferably placed at an angle of twenty 45 degrees to a tangent of the cylinder at the point where the style makes contact therewith. In the practical formation of sound-records according to the methods heretofore used this has not been feasible.

50 In Fig. 2 is shown diagrammatically the ordinary operation as heretofore practiced of making a record. The undulations which would be formed by the stylus if the record-surface were moved at the speed heretofore 55 employed is indicated by full lines. These undulations are close together and abrupt in character. As the cutting edge of the stylus

descends into the depression succeeding each undulation it moves freely in response to the vibration of the diaphragm until the heel of the stylus makes contact with the crest of the undulation, as shown in Fig. 2, whereupon the cutter ceases to penetrate and the vibration is lost. The depth to which the depression would have been cut had not the stylus 60 been checked by contact with the crest of the undulation is indicated by dotted lines under each depression; but this does not represent all the loss to the height of the undulations, for by damping the swing of the diaphragm in its downward direction its reactionary swing to the opposite side of its medial position is checked or lessened to substantially an equal amount, so that the loss 65 is on the crest of the undulation, as well as in the depression. This, it will be observed, is not merely a loss in amplitude or power, but also a loss in the character of the record during such period, be it longer or shorter, as the style fails to move in strict accordance 70 with the sound-vibration. Were the diaphragm and stylus free to make their full swing without any damping effect due to the contact of the style with crests of the undulations, the crests of the latter and the depressions or valleys between them would be 75 represented by the dotted lines of Fig. 2. It will be apparent from this diagrammatic illustration that the amplitude of vibration imparted to the reproducing-diaphragm by the undulations of a record as heretofore formed must of necessity be much less than that imparted to the air particles by the original 80 sounds and that therefore the reproduced sounds will not be nearly so loud as the originals.

85 In the practical making of sound-records prior to the present invention the record-tablets have usually been in the form of cylinders of wax-like material about one-half decimeter in diameter revolving at about one hundred and ten revolutions per minute, giving a surface speed to the tablet of about one hundred and seventy-five decimeters, in round numbers. By the present invention the surface speed of the tablet is such as to give the revolving diaphragm perfect freedom of vibration without any damping effect due to the contact of the undulation with the heel of the stylus. The requisite surface speed might be attained by increasing the number of revolutions per minute given to cylinders one-half decimeter in diameter, or thereabout, as heretofore employed. There are practical objections to this, however, and it is therefore preferable to drive the cylindrical tablet at the same number of revolutions—viz., about one hundred and ten per minute—and to so increase the diameter of the tablet as to secure the requisite surface speed, and it has been found 95 that a cylinder about one and one-fourth (1.25) decimeters in diameter will attain a sufficient surface speed when revolved at the rate mentioned. Obviously the same results 100 105 110 115 120 125 130

might be obtained by increasing the number of revolutions and making the diameter less than one and one-fourth (1.25) decimeters or by decreasing the number of revolutions and increasing the diameter of the tablet, and such changes would come within the scope of this invention, the essential feature of which is that the surface speed must be such as to permit the diaphragm to make its full sweep without any contact between the heel of the recording-stylus and the crests of the undulations.

In Fig. 1 is shown a tablet which is preferably about one and one-quarter decimeters in diameter and when practicing the method of the present invention is given approximately one hundred and ten revolutions per minute, thereby attaining a surface speed of about forty-four meters per minute. By giving the tablet this surface speed and causing sonorous vibrations to impinge upon the diaphragm of a recorder whose stylus is in contact with the surface of the tablet a record-groove will be formed therein having undulations with long, gentle, easy slopes as contradistinguished from the short abrupt undulations heretofore formed. The general character of the record-groove thus formed is indicated in an exaggerated degree by the wavy line to the right of the recording-stylus in Fig. 1. This is not intended to be an accurate representation of actual undulations corresponding to sound-waves; but in Figs. 3 and 4 are seen representations of the undulations corresponding to the syllables "Sol" and "Do," respectively, when sung by a barytone voice at about the middle register as such undulations appear when seen under the microscope. In Fig. 5 are represented the undulations of a record-groove corresponding to the syllable "Sol" when sung by a barytone voice and seen under a microscope when the same is recorded by the method used prior to the present invention—that is to say, by imparting to the tablet-surface a speed of about one hundred and seventy-five decimeters per minute—while in Fig. 6 are represented the undulations corresponding to syllable "Do," likewise made by the old method, by a barytone voice and magnified.

It is to be understood that the records whose undulations are represented in Figs. 3 and 5 were made simultaneously from the same voice sounding the same syllable, the undulations being subsequently magnified the same number of diameters, and the same is true of the undulations reproduced in Figs. 4 and 6. Consequently by comparing Fig. 3 with Fig. 5 or Fig. 4 with Fig. 6 the difference in appearance between the old record and the new may be plainly seen.

It will be seen that the undulations of Figs. 3 and 5 made by the method of the present invention have long gentle easy slopes as contradistinguished from the undulations of Figs. 4 and 6 made by the old method, which have short abrupt curves and sharp angles.

Referring again to Fig. 1, in connection with Figs. 3 and 4, it will be seen that by reason of the long gentle easy slopes of the undulations the heel of the stylus will at no time contact with the crest of the receding undulation. As a result of this three highly-important advantages are secured.

First. The amplitude of the undulations is greatly increased—that is, the height of the undulations from the crests thereof to the bottom of the intermediate depressions is much greater. The vibrations of the diaphragm and stylus are not checked or damped, and therefore the crests of the undulations in the record, as well as the depressions between them, will accurately correspond to the full swing of the recording-diaphragm in both directions. This will cause the record to impart to the reproducing-diaphragm vibrations equal in amplitude to those impressed upon the recording-diaphragm by the recorded sounds, and the reproduced sounds will therefore be approximately as loud as the sounds originally recorded.

Second. The angle between the axis of the recording-stylus and the tangent to the cylinder at the point of contact with the stylus need not be more than twenty degrees. This is approaching very nearly the theoretical line of least resistance for the stylus, which line is along said tangent.

Third. The undulations will accurately correspond to the vibrations of the recorded sound-waves without distorting the larger and stronger ones and without distorting or suppressing the more minute and feeble ones. Since the heel of the stylus does not make contact with the undulations, the stylus will be free to cut the undulation in exact response to the action of the stronger sound-waves without distortion. This will be readily understood in connection with the explanation already given, and the decreased resistance, due both to this and to the advantageous angle for the cutting-style, enables the feeble and minute undulations to which tone color or quality is due to more effectively impress themselves upon the style, and through it upon the record. It may be also observed that the increased velocity with which the record-tablet moves also decreases the resistance to the cutting action of the style.

In addition to the advantages thus secured in the formation of the tablet or record greatly-improved results are secured when reproducing from the record thus formed. The long gentle easy slopes of the record act in an even yet forceful manner on the rubbing-style of the reproducer, and thereby impart to the reproducing-diaphragm smooth but positive vibrations exactly corresponding with the undulations of the record. In other words, the reproducing-stylus is in continuous contact with and under the continuous control of the undulatory record. Owing to the entire absence of short abrupt curves in

the record, no blows are struck by the undulations upon the rubbing-style, and the foreign vibrations heretofore caused thereby are therefore absent from the reproduced sounds. Furthermore, the rubbing-style will, on account of the long gentle slopes, neither skip over the crests nor across the sharp depressions between the crests, so that the vibrations of the reproducing-diaphragm will be at all times in exact accord with the undulations of the record. In short, by means of the present invention a record corresponding in character and extent to the sonorous vibrations is secured, which record positively imparts to the reproducing-diaphragm vibrations alike in character and extent to those of the recording-diaphragm. The result of this is that the reproduced sounds will be of equal loudness and purity with the original sounds and will possess all these characteristics to which tone color or quality are due.

Having thus described the invention, what is claimed is—

1. The method of forming a sound-record which consists in placing a vibratory cutting-style in contact with a record-tablet, at an acute angle to the tangent at the point of contact, impressing sonorous vibrations upon the style and simultaneously moving the tablet relative to the style with a high surface speed sufficient to prevent the heel of the style from making contact with the undulations, and to cause the style to cut continuously a record corresponding in form to the sound-waves.

2. The method of forming a sound-record which consists in placing a vibratory cutting-style in contact with a record-tablet at a small angle with the tangent at the point of contact, and simultaneously vibrating the style by the action of said waves and moving the tablet with a minimum surface speed of about forty-four meters per minute, substantially as described.

3. The method of forming a sound-record which consists in placing a vibratory cutting-

style in contact with a tablet, causing said style to vibrate in a plane approximately perpendicular to the surface of the tablet by impressing sonorous vibrations thereon, and simultaneously moving said tablet at such a speed that sounds requiring one minute in their production form a record approximately forty-four meters in length.

4. The method of forming a sound-record which consists in placing a vibratory recording-style in contact with a cylindrical record-tablet approximately one and one-fourth (1.25) decimeters in diameter and simultaneously vibrating the style by the action of sound-waves and revolving said tablet with a surface speed of approximately forty-four meters per minute.

5. A sound-record consisting of a tablet of wax or wax-like material having an undulatory sound-groove cut or engraved therein, said undulations being of great and varying amplitude and having long, gentle, easy slopes, thereby giving reproductions sensibly equal in volume to the original sounds.

6. A sound-record consisting of a tablet having a sound-groove with undulations of varying depth, said undulations being of such lengths that sounds occupying one minute in their production form a record approximately forty-four meters in length.

7. A sound-record consisting of a cylindrical tablet substantially one and one-quarter decimeters in diameter and having a sound-groove with undulations of varying depth, said undulations being of such lengths that sounds occupying one minute in their production form a record approximately forty-four meters in length.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

REEVE LEWIS,
PHILIP MAURO.

207

No. 714,707.

Patented Dec. 2, 1902.

J. W. JONES.
DUPLICATING APPARATUS.

(Application filed Jan. 16, 1902.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.

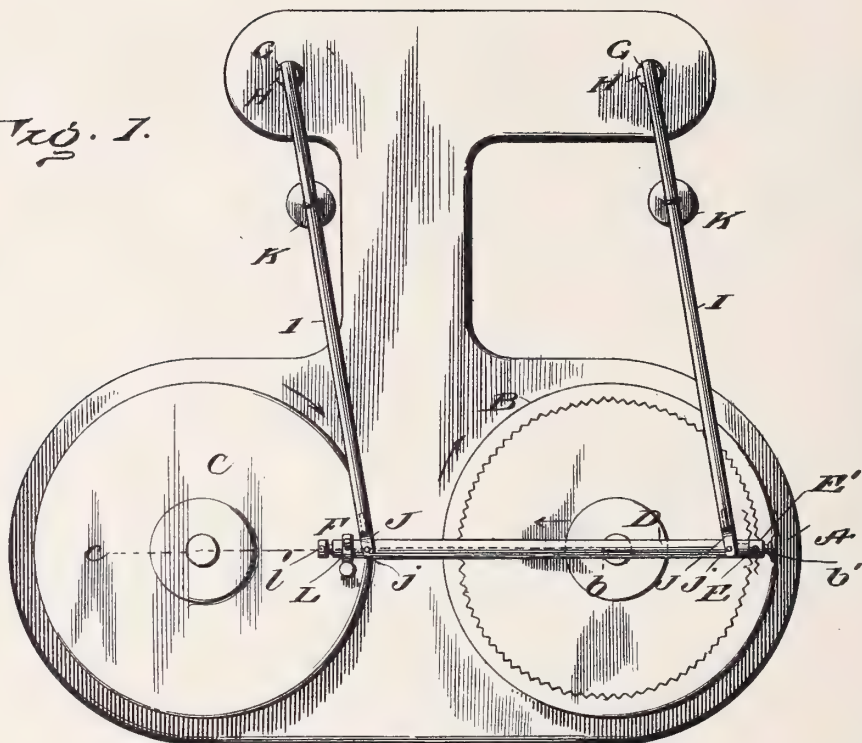
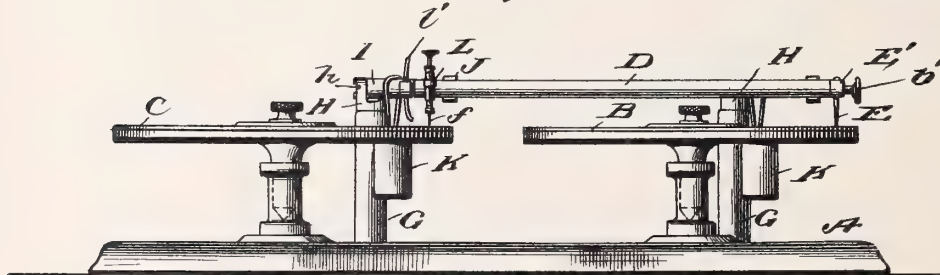


FIG. 2.



Inventor

Joseph W. Jones
By *Thos. Mauro*
Attorney

Witnesses

Jos. Jones
Thos. Jones

No. 714,707.

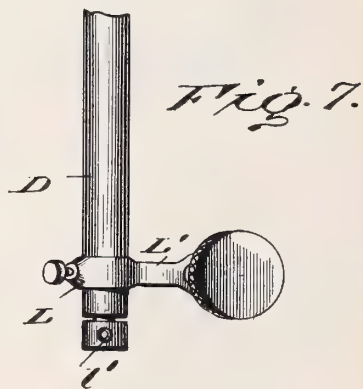
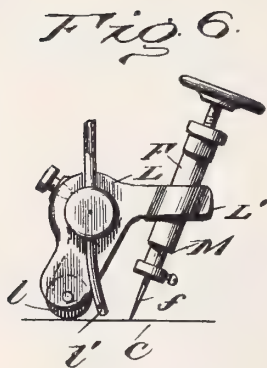
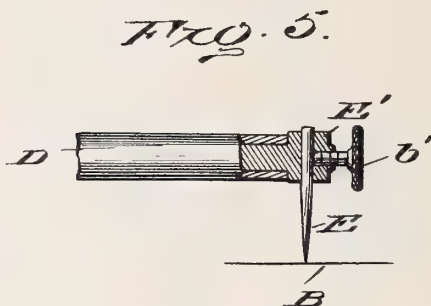
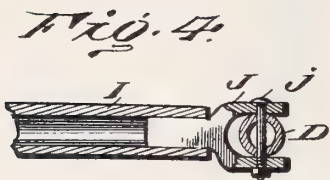
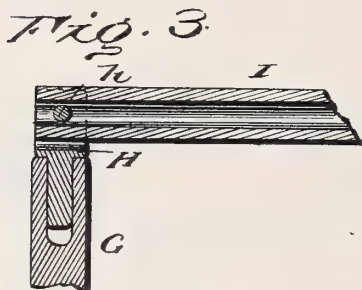
Patented Dec. 2, 1902.

J. W. JONES.
DUPLICATING APPARATUS.

(Application filed Jan. 16, 1902.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses

My Mother
Dear Lewis

Inventor

Joseph W. Jones
By Thos Mauro
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y.

DUPLICATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 714,707, dated December 2, 1902.

Application filed January 16, 1902. Serial No. 90,057. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, of the city, county, and State of New York, have invented a new and useful Duplicating Apparatus, which invention is fully set forth in the following specification.

This invention relates to the production of sound-records of the type characterized by spiral grooves of uniform depth having lateral undulations corresponding to sound-waves and produced upon a flat tablet or disk, the type being known as "zigzag" disk sound-records or "zigzag" records. The present invention is a duplicating apparatus for transferring upon a disk of suitable composition a copy or duplicate of a master-record of the type described. Two horizontal turn-tables are arranged side by side, one carrying the master-record and the other the blank tablet or plain disk of suitable composition, and means are provided for rotating the two turn-tables at the same speed.

The invention consists, first, in a thrust-bar parallel to the turn-table and carrying at one end an ordinary reproducing-stylus or "follower" in operative contact with the record-groove of the master and carrying at its other end a recording device in operative contact with the plain disk.

The invention consists, second, in the manner of mounting or supporting this thrust-bar or transferring apparatus; and the invention consists, further, in the details of construction hereinafter described and claimed.

The drawings annexed hereto as part of this specification illustrate a convenient and preferred form of my invention.

Figure 1 is a plan view; Fig. 2, a front elevation, and Figs. 3 to 7 show details.

Upon the base-plate A are two horizontal turn-tables driven in the same direction and at the same speed and carrying a master-record and a plain disk B and C, respectively. The plain disk C may be of any suitable material that may be readily and cleanly cut or engraved by the action of the recording device, provided only that the material have sufficient body to withstand the subsequent handling. Preferably I employ such a composition as pointed out in my patent No. 688,739, granted December 10, 1901.

D is the thrust-bar, lying parallel to the

disks B and C, above them, and preferably in their central line *b c*. At one end of bar D is secured the follower—a reproducing stylus or point E, placed in operative contact with the spiral record-groove on disk B—and at the other end of bar D is the recording device F, having the recording-tool *f* inserted into the surface of plain disk C. The thrust-bar D is supported in any desirable manner, so as to have longitudinal play, but be always substantially parallel with itself. Now when the turn-tables revolve the spiral groove of disk B acts as a feed-screw, moving stylus E (and all of thrust-bar D) longitudinally of bar D, as indicated by the arrow. Thrust-bar D moving always parallel to itself, the recording device F travels the same way radially of the plain disk C, and the recording-tool *f* traces in the surface of disk C a spiral groove corresponding to the spiral groove in the master-record B. Any lateral irregularities constituting the real "record" cause longitudinal vibrations of the thrust-bar D, which are reproduced by the recording-tool *f*, the latter thus producing in the surface of the plain disk C a spiral groove of uniform depth and having lateral undulations corresponding to the sound-record in the master. The peculiar advantage of having this rigid longitudinal thrust-bar D is that it carries the follower and the recording-tool rigidly and in never-failing positions with regard to each other, so that there is no lost motion, due to pivoting of levers, flexibility of arms, &c. The bar D is preferably an aluminium tube, and a satisfactory method of supporting the same will now be described.

G and G are pillars rising from base-plate A at the rear of the turn-tables, the line G G being parallel to the central line *b c*. In the top of each of the pillars G is inserted the swivel H, having a fork in which is secured by a horizontal pin *h* one of the two parallel arms I. (See Fig. 3.) These parallel arms I are likewise aluminium tubes, and in the front end of each is inserted the fork J, in which the thrust-bar D is pivoted by the pin *j*. (See Fig. 4.) Thus the points G G *j j* define a parallelogram, and thrust-bar D is free to swing around radially on the disks B and C, but always parallel to itself and to the central line *b c* on the turn-tables.

K and K represent weights supported from one of the parallel arms by flexible connection. These weights serve to hold the follower in intimate contact with the record-groove of the master-disk and the recording-tool in proper relation to the surface of the plain disk. These weights are adjustable longitudinally on the parallel arms to regulate the pressure on the points E and *f*, and by having the connections flexible—*i. e.*, a cord—longitudinal vibrations of the thrust-bar D (and the swinging of the parallel arms) are not checked or in any manner interfered with.

Fig. 5 shows the follower or reproducing-stylus E secured in a metal casting E' by the thumb-nut *b*, the casting E' having a shank forced into the open end of the tubular thrust-bar D.

Figs. 6 and 7 illustrate the recording device F. A casting L is fitted snugly upon the end of thrust-bar D. Extending forwardly from this casting L is a member L', through which passes recording device F. Extending downwardly from the piece L is a flange carrying the antifriction device *l*, the latter running over the surface of the plain disk C, and preferably a small pipe *l'*, leading from a fan, discharges a blast of air immediately between the antifriction device *l* and the recording-tool *f*. The recording device F contains an ordinary "tailpiece" M, (common in lathes,) at the lower end of which is the recording-tool *f*, the tailpiece regulating the depth of groove cut or engraved by the tool *f*.

While I have described one particular mounting of the thrust-bar D, it is obvious that others may be employed. It is further obvious that whereas I have described the turn-tables as horizontal and the thrust-bar as resting upon top of them by gravity assisted by the weights K, yet this position may be changed, a spring or other device serving to hold the thrust-bar, with its following and recording points, in operative contact with the two disks. Of course the best results are obtained by having the thrust-bar lie in the vertical plane upon the central line *b c*, and the points E and *f* travel in that plane radially of the disks; yet this is not absolutely necessary. The position and adjustment may be varied considerably without any material difference in results.

I have described the parallel arms H H and the thrust-bar D as constituting a parallelogram, yet if they do not constitute an exact geometric parallelogram it is not material. So,

also, if for any reason the exact geometric outline is distorted it is likewise immaterial. The operation of the apparatus is the same. The rotation of the feed-screw of disk B will propel the recording-tool *f* across the surface of the rotating disk C and the lateral undulations of the master-disk B will produce corresponding lateral undulations in the groove being engraved in the surface of disk C—that is, will produce lateral undulations corresponding to the sound-waves.

Changes may be made in the construction and arrangement of this apparatus and certain parts of it may be used to the exclusion of others without in any case departing from the spirit of my invention.

Having thus described my invention, I claim—

1. An apparatus for making duplicates of zigzag disk sound-records, consisting of the combination with two horizontal turn-tables, arranged side by side and carrying a master-record of the kind described and a suitable blank-disk respectively, of two parallel arms swinging across said turn-tables from fixed pivots, and a rigid thrust-bar pivoted at the ends of said arms to reciprocate always parallel to itself, said bar carrying at its ends a follower and a recording-tool in operative contact with said master and blank respectively, whereby upon the rotation of said turn-tables an exact counterpart of the master is produced automatically in the blank by means of the longitudinal thrust of said thrust-bar.

2. An apparatus for making duplicates of zigzag disk sound-records, consisting of the combination of two turn-tables for a master-record and blank-disk respectively, and a rigid thrust-bar parallel with said tables and carrying a follower and a recording-tool for engagement with the master and blank respectively, said thrust-bar being located within the perpendicular plane of the centers of said tables, and being supported in such manner as to have longitudinal play always parallel to itself and practically entirely within said plane of said centers, as and for the purpose described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH W. JONES.

Witnesses:

C. A. L. MASSIE,
WILLIAM E. HILLS.

No. 715,003.

Patented Dec. 2, 1902.

E. BERLINER & J. SANDERS.
SOUND BOX FOR RECORDING AND REPRODUCING APPARATUS.

(Application filed Sept. 6, 1902.)

(No Model.)

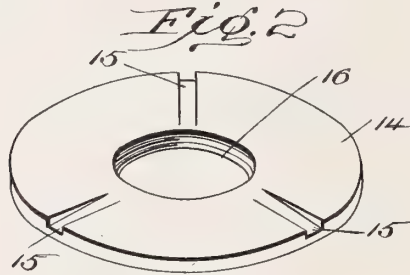
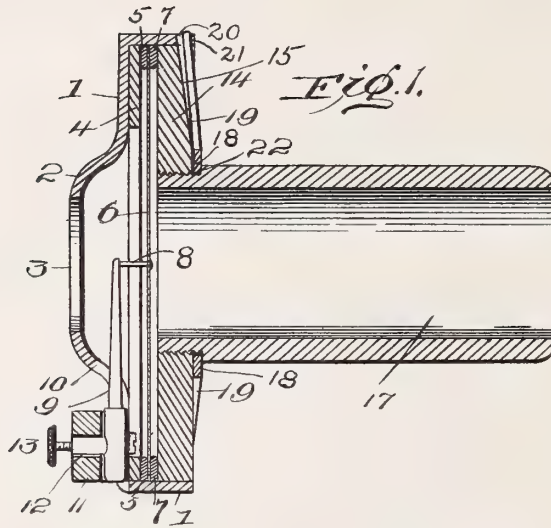


Fig. 3.

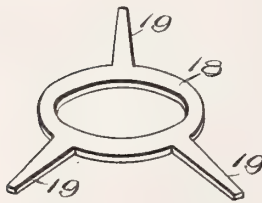


Fig. 4.

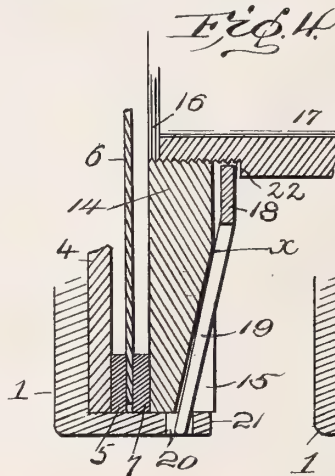
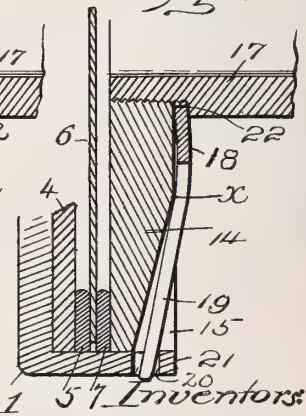


Fig. 5.



Witnesses:

J. M. Fowler Jr.
H. T. Chapman.

Inventors:
Emile Berliner,
Joseph Sanders,
By *Lyons & Bisping.* Attys.

UNITED STATES PATENT OFFICE.

EMILE BERLINER AND JOSEPH SANDERS, OF WASHINGTON, DISTRICT OF COLUMBIA.

SOUND-BOX FOR RECORDING AND REPRODUCING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 715,003, dated December 2, 1902.

Application filed September 6, 1902. Serial No. 122,332. (No model.)

To all whom it may concern:

Be it known that we, EMILE BERLINER and JOSEPH SANDERS, citizens of the United States, and residents of Washington, in the District of Columbia, have invented certain new and useful Improvements in Sound-Boxes for Recording and Reproducing Apparatus, of which the following is a specification.

Our invention has reference to improvements in sound-boxes for gramophones or other sound recording and reproducing apparatus. In sound-boxes of this general character a diaphragm is mounted between soft-rubber gaskets, which are clamped together and to the sound-box by a metal ring, which either fits into the sound-box frictionally and is forced down upon the rubber gaskets, and thus clamps the diaphragm between them and to the sound-box, or else the metal ring is secured to the sound-box ring by screws which are properly tightened. In either case the edge of the diaphragm is held between the rubber gaskets in the sound-box under a certain definite pressure, which is requisite to dampen it against its own fundamental notes and to prevent the rattling of the diaphragm, particularly when loud sounds are uttered against it. Now it has been found in practice that it requires considerable skill to clamp the diaphragm in this manner with that definite pressure which is requisite in order to obtain the best effects, and it has further been found that if the diaphragm is once properly clamped between its damping rings or gaskets the original state of pressure under which the edge of the diaphragm is held is not maintained indefinitely, but becomes weaker and weaker as the rubber gaskets become older, since soft rubber loses its elasticity gradually by age. So it happens that a diaphragm which is properly mounted at one time is found after a while to be comparatively loose between the gaskets, and it now requires again the exercise of considerable skill either to tighten the clamping-ring by the screws provided for this purpose, or otherwise, or else to remove the diaphragm and the aged rubber gaskets and to again mount the diaphragm between fresh gaskets. It will be seen from this that

it is difficult, if not impossible, to mount the diaphragms in a number of sound-boxes with the same pressure between the rubber rings, so that each of a number of sound-boxes will give different results.

It is the object of our invention to overcome these difficulties and to provide means whereby any number of diaphragms can be mounted in sound-boxes with the same damping-ring pressure in such manner that the initial clamping-pressure is maintained for a long time, if not indefinitely, notwithstanding the unavoidable aging of the rubber. For this purpose we so construct the sound-box that the clamping-ring holds the diaphragm and rubber gaskets in the sound-box by elastic pressure, so that a loss of elasticity of the rubber by age is compensated by the continued elastic pressure exerted upon the clamping-ring. All this will more fully appear from the following detail description with reference to the accompanying drawings, in which—

Figure 1 represents an axial vertical section of our improved sound-box. Fig. 2 is a perspective view of the diaphragm-clamping ring. Fig. 3 is a perspective view of the spring which provides the elastic pressure upon the clamping-ring; and Figs. 4 and 5 are vertical axial sections of a portion of the sound-box, illustrating the function of the spring.

Like numerals of reference indicate like parts throughout all the drawings.

The case or shell 1 of the sound-box is here shown as formed with a dome 2 in its center and with a rather wide central opening 3 in the dome. This construction is not essential, since it only serves as a protection to the style and diaphragm, so that the sound-box may be laid on its face without harm to the diaphragm or to the connection between the diaphragm and style-holder. Against the inner face of the shell 1 is secured an annular ring 4, and upon this ring are placed in succession a soft-rubber gasket 5, the diaphragm 6, and a soft-rubber gasket 7. To the center of the diaphragm is secured a pin 8, the outer end of which is fastened to the style-holder 9, which extends parallel with the diaphragm through a slot 10 in the face of the case 1 and

through a slot in a block 11, which is fastened to the case. This block 11 has also a central perforation through which a nipple 12 projects laterally from the style-holder, and in this nipple passes the set-screw 13, which removably secures the style in the style-holder.

All the parts so far described are old and do not constitute a part of our invention.

Our clamping-ring 14, which loosely fits into the case and rests against the gasket 7, is a rather solid piece of metal, as shown, and has formed in its exposed outer surface three uniformly-spaced radial grooves 15 15 15, which are deepest at the periphery of the ring and become shallower toward the center, and finally merge into the outer surface of the clamping-ring, as is best illustrated in Fig. 2. This clamping-ring has a central screw-threaded opening 16, adapted to receive the screw-threaded end of the sound-conveying tube 17. Against the outer face of the clamping-ring is fitted the clamping-spring 18, which is best shown in Fig. 3, and is an annulus with three uniformly-spaced radially-extending arms 19 19 19. The annular portion of this spring is flat, so that when laid upon the clamping-ring 14 the annular portion of the spring will be substantially parallel with the face of the clamping-ring. The radial arms of the spring are bent angularly, so that they will fit and partly descend into the grooves 15 of the clamping-ring. This spring is made rather thin and is either of steel or other spring metal. In the drawings, however, for the sake of clearness of illustration this spring is shown rather thick. In the cylindrical flange of the case 1 are formed three slots 20, near the edge of the flange and equally spaced like the grooves 15 of the clamping-ring and the radial arms 19 of the clamping-spring, and the arms 19 of this spring are sufficiently long that when the spring is placed against the clamping-ring, with the arms 19 in the grooves 15, these arms may be depressed into the grooves until they engage and snap into the slots 20 and are there held by the webs 21. When in this condition and before the sound-conveying tube is screwed into the clamping-ring, the arms 19 at points near the annular portion of the spring abut against those points of the grooves 15 which just merge into the general surface of the ring. This condition of affairs is shown in Fig. 4, and the point of contact between one of the spring-arms and the clamping-ring is marked by the letter *x*. In this condition the spring-arms pressing at the three points *x* upon the clamping-ring holds the latter with moderate pressure against the gasket 7 without perceptibly compressing the gaskets. If now the sound-conveying tube 17 is screwed into the clamping-ring, the ledge 22 of this tube bears down upon the annular portion of the spring 18, and the spring-arms 19 at the points *x* force the clamping-ring more strongly against the gasket and compress the

same, and thus clamp the diaphragm elastically in the sound-box. This condition is illustrated particularly in Fig. 5 on a large scale, but is also shown in Fig. 1.

It will now be seen that with the diaphragm mounted and clamped as described it will be held between its rubber gaskets with uniform pressure, even if by age the rubber should lose its elasticity entirely, since any loss of pressure due to such deterioration of the rubber would be compensated by the clamping-spring 18, which would follow up and press the clamping-ring 14 against the gaskets with practically undiminished force.

Since the springs 18 are in practice stamped out of uniform sheets of spring metal, these springs will all have practically the same resiliency, and therefore the diaphragms in ever so many sound-boxes will all be held under practically the same pressure.

In the assembling of the gaskets, diaphragm, clamping-ring, clamping-spring, and sound-conveying tube no tools are required and no skill has to be exercised, so that injured parts can be taken off and other duplicate parts inserted without requiring special and renewed adjustment of the apparatus.

It will be understood that we are not limited to the identical construction of clamping-ring and clamping-spring herein described, since these forms may be departed from in various ways without departing from our invention.

Having now fully described our invention, we claim and desire to secure by Letters Patent—

1. A sound-box for recording and reproducing apparatus having a diaphragm damped around the edge and an elastic clamp bearing upon the damping device to hold the diaphragm in its seat, substantially as described.

2. In a sound-box for sound recording and reproducing machines, a diaphragm mounted at the edges between elastic gaskets, in combination with a spring-clamp securing the diaphragm in place and bearing upon the gaskets with spring-pressure, substantially as described.

3. A sound-box for recording and reproducing apparatus composed of a case, a diaphragm between rubber gaskets, a clamping-ring and a spring holding the clamping-ring against the gaskets and diaphragm, substantially as described.

4. A sound-box for recording and reproducing apparatus composed of a case, a diaphragm damped around the edge seated in the case, a ring-clamp bearing upon the damped edge of the diaphragm and a three-armed spring bearing upon the clamping-ring at equidistant points, substantially as described.

5. A sound-box for recording and reproducing apparatus comprising a case, a diaphragm damped around its edge seated in the case, a clamping-ring bearing upon the clamped edge of the diaphragm and having three radial

5 grooves in its outer surface, and a three-armed spring having its free ends locked in the case so as to engage the grooves and bearing with its arms on the clamping-ring, so as to hold the latter with uniform yielding pressure against the damped edge of the diaphragm, substantially as described.

6. A sound-box for recording and reproducing apparatus comprising a case, a diaphragm damped around its edge seated in the case, a clamping-ring bearing upon the damped edge of the diaphragm, an annular three-armed spring bearing with its arms upon the clamping-ring at equidistant points, and a sound-conveying tube screwing into the clamping-

ring and pressing the spring against the latter, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of the subscribing witnesses.

EMILE BERLINER.

JOSEPH SANDERS.

Witnesses as to Emile Berliner:

C. C. STEVENSON,

GEORG S. STEFFEUR,

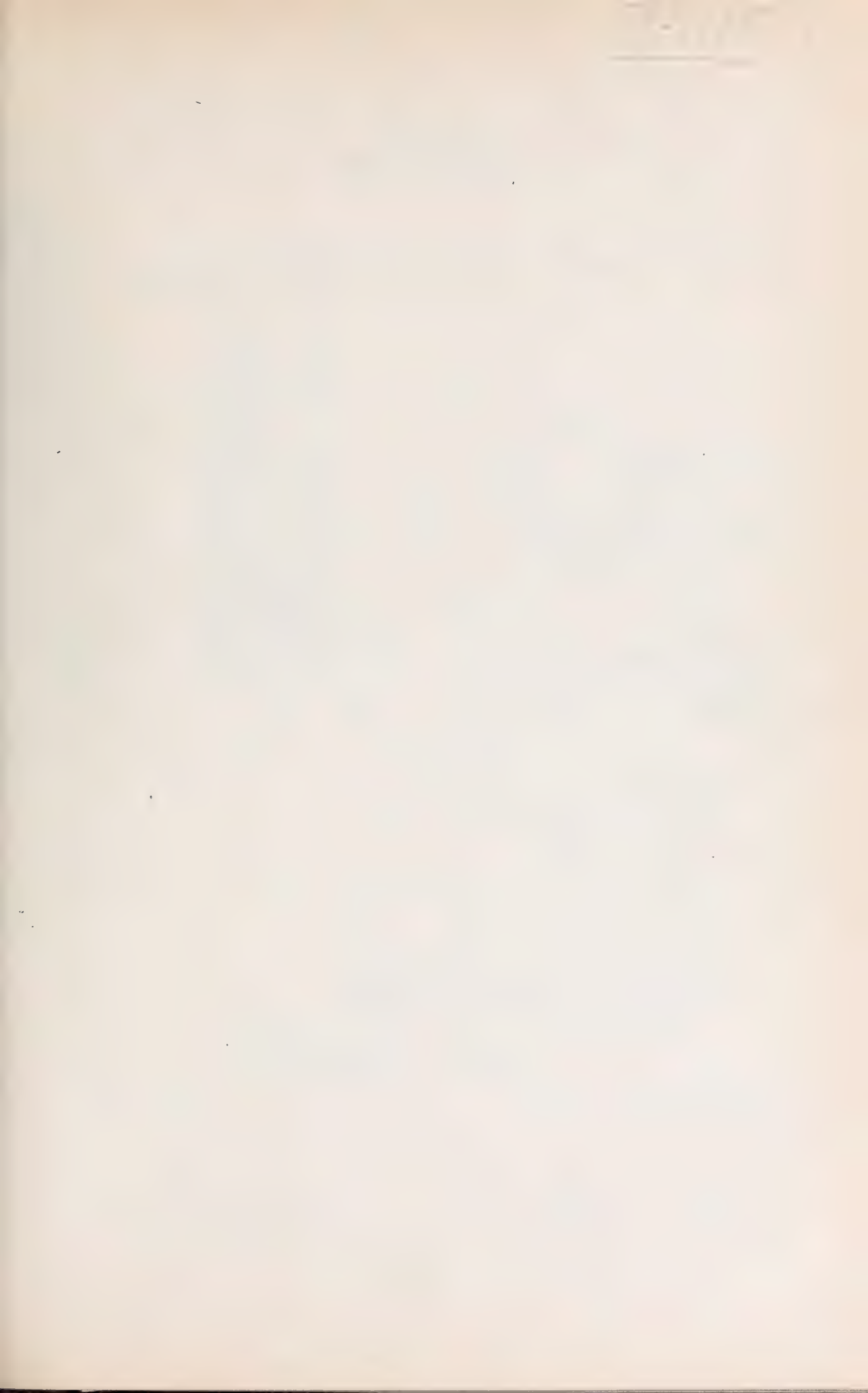
HEINRICH SCHNEHAG,

EMMA G. WHITE.

Witnesses as to Joseph Sanders:

EDWIN S. CLARKSON,

F. T. CHAPMAN.



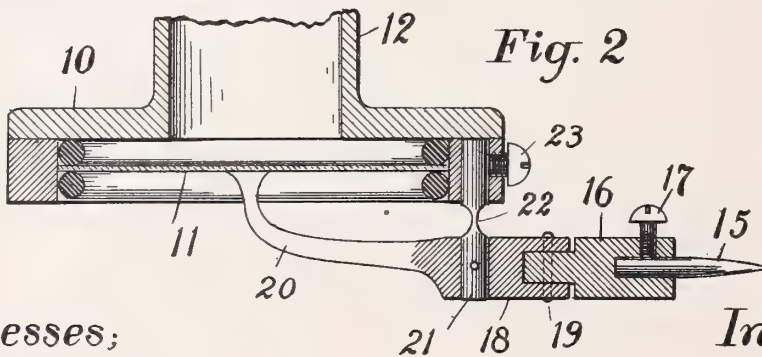
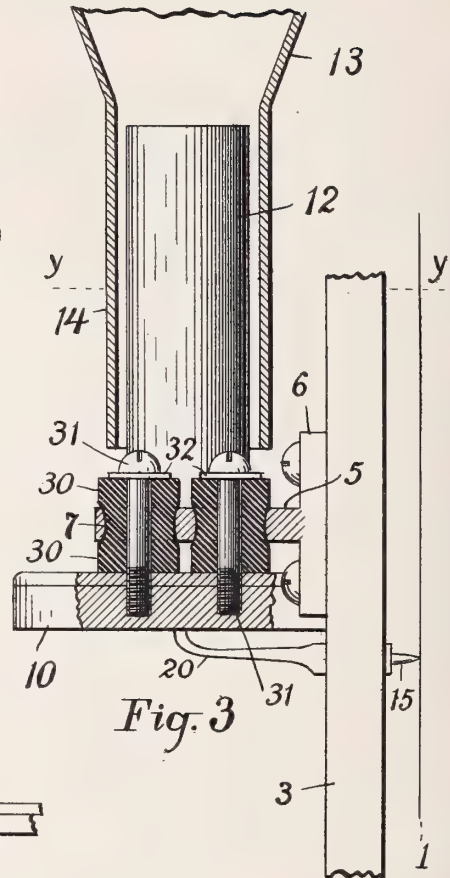
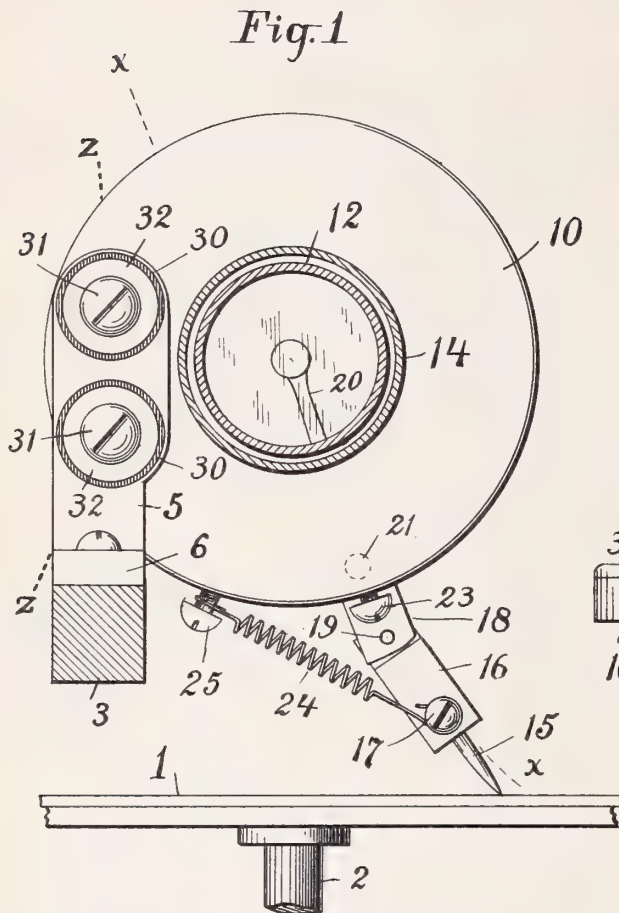
No. 715,115

Patented Dec. 2, 1902.

G. A. MOORE.
PHONOGRAPHIC SOUNDER.

(Application filed Mar. 8, 1902.)

(No Model.)



Witnesses;

M. W. Upham.

George M. Harrou

Inventor,

George A. Moore;

By A. B. Upham.
His Attorney.

UNITED STATES PATENT OFFICE.

GEORGE A. MOORE, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO THE MOORE TALKING SCALE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

PHONOGRAPHIC SOUNDER.

SPECIFICATION forming part of Letters Patent No. 715,115, dated December 2, 1902.

Application filed March 8, 1902. Serial No. 97,282. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. MOORE, a citizen of the United States, and a resident of Brookline, in the county of Norfolk, State of Massachusetts, have invented certain new and useful Improvements in Phonographic Sounders, of which the following is a full, clear, and exact description.

The object of this invention is the construction of an improved phonographic sounder to be used in connection with the weighing-machine set forth in my companion application, Serial No. 76,850, the requirements of which are that the sounder must be capable of adjustment in a line parallel with the face of the record-disk and after which adjustment to some designated point shall be substantially fixed in position while the record-disk rotates in contact with the sounder-stylus.

Referring to the drawings forming a part of this specification, Figure 1 is a sectional plan view on the line Y Y in Fig. 3. Fig. 2 is a section of the same on the line X X in Fig. 2. Fig. 3 is a sectional elevation on the line Z Z in Fig. 1, this last figure being but slightly enlarged, while Figs. 1 and 2 are made of nearly double the usual dimensions of my sounder.

The reference-numeral 1 designates a portion of a record-disk designed to be rotated upon a shaft 2.

3 is a vertical rod longitudinally movable in a line parallel with the face of the record-disk 1. Suitably bolted to said rod by means of elbows 6 is an arm 7, carrying the sounder-box 10, containing the usual diaphragm 11.

The stylus 20, cemented in the ordinary manner at one end to the diaphragm, is fulcrumed by means of the slender rod or pintle 21, which is fixed in a suitable opening in the sounder-box by means of a set-screw 23 and is pinned in the stylus-head 18, being laterally cut away intermediate of the said box and head to give it transverse resilience, as shown at 22.

Inasmuch as the sounder is designed to be substantially fixed in position during the revolution of the record-disk and the latter is liable to be somewhat warped or otherwise so out of true as to cause its face to vary in dis-

tance from the sounder, I have devised the following construction for permitting the needle-point to accommodate itself to the record. This consists in jointing together the stylus-head 18 and the needle-socket 16, the pivot 19 being made vertical or parallel with the rod 3 and the face of the record-disk, so that the needle-point can swing away from the said face, at the same time the joint being made to fit so snugly that the vertical vibrations communicated to the needle-point by the record-grooves shall be perfectly transmitted through the stylus-head and stylus to the diaphragm. A suitable tension-spring 24, anchored at one end to the screw 25 and at the other to the set-screw 17, by which the needle-point is secured in the socket 16, serves to retain the needle-point against the record-disk with a proper resilient pressure.

The sounder being designed to be vertically varied in position for a distance nearly equal to the radius of the record-disk and at the same time to communicate the vibrations of the diaphragm up to the fixed trumpet 13, I form the sounder-box with a tube 12, standing upward to a height approximately equal to the radius of the record-disk, and provide the lower end of the trumpet 13 with a tube 14 of nearly the same length and of a diameter to very loosely receive the tube 12, the difference in diameters being such that there shall be no danger of the said parts contacting and so causing a buzzing or rattling sound when the sounder is speaking.

Although the record-grooves on the disk are designed to be perfectly concentric, there is danger of their varying very slightly. Further, in vertically positioning the sounder it is seldom possible to bring the needle-point into exact alinement with a record-groove. It is therefore necessary to provide the sounder-box with a slight degree of vertical play. To do this, I secure the sounder to the arm 5 in the following manner: Through enlarged holes 7 in said arm I pass two screws 31, having washers 32 beneath their heads, and between said arm and the sounder-box and also between said arm and said washers I introduce soft-rubber washers or cushions 30. Said screws being set down to quite firmly com-

press said cushions, the sounder-box is held with a sufficient degree of firmness, while at the same time there is enough yield to the rubber to permit the needle-point to slightly tilt the sounder, and so put itself accurately in any record-groove to which it is presented.

Although, as my description above would seem to indicate, I may use separate sections of rubber 30 between the arm 5 and the sounder-box and the screw-heads, yet I prefer to make such sections as part of a continuous rubber washer or cushion extending from the sounder-box through the openings 7 up to the washers 32. The advantage of this is that it is thereby made entirely impossible for the screws 31 to contact with the sides of the openings 7 and so interfere with the perfection of the tones emitted by the sounder.

What I claim as my invention, and for which I desire Letters Patent, is as follows, to wit:

1. The combination with a phonographic sounder, of a stylus therefor having its needle-point pivoted thereto with a joint permitting flexure in a plane parallel with the diaphragm, and resilient means pressing said needle-point laterally in said plane, substantially as described.

2. The combination with a phonographic sounder, of a stylus and a needle-point socket jointed together to swing in a plane parallel with the sounder-diaphragm, and a tension-spring anchored to the sounder-box and said socket to elastically draw said needle-point in said plane, substantially as described.

3. The combination with a phonographic sounder, of a stylus affixed at one end to the sounder-diaphragm, the centrally-thin pintle fixed in the sounder-box and also in the head of said stylus, the needle-point socket jointed

to said head to swing in a plane parallel with said diaphragm, and the tension-spring terminally secured to said box and said socket, substantially as described.

4. The combination of a disk record, a sounder having its axis parallel with the face of said disk and movable along said axis between the center and periphery of said disk, said disk and axis being vertical, a section of tubing rising from the sounder with its axis coincident with that of the sounder and receiving acoustic vibrations therefrom, and a fixed trumpet rising vertically from above said sounder with its smaller end loosely inclosing said section of tubing, substantially as described.

5. The combination with a phonographic sounder, of an arm having an enlarged opening, a screw passing through said opening and fixed in the sounder-box, and resilient cushions between said arm and box and between said arm and the screw-head, substantially as described.

6. The combination with the rod, of the arm rigidly projecting therefrom and formed with a plurality of openings, a phonographic sounder, screws freely passing through said openings and fixed in the sounder-box, washers beneath the heads of said screws, and soft-rubber cushions on said screws between said box and washers, substantially as described.

In testimony that I claim the foregoing invention I have hereunto set my hand this 28th day of February, 1902.

GEORGE A. MOORE.

Witnesses:

A. B. UPHAM,
CHAS. A. COUCH.

UNITED STATES PATENT OFFICE.

GEORGE A. BALDWIN, OF WALNUTGROVE, MISSOURI, ASSIGNOR OF ONE-HALF TO J. W. CARMACK, OF WALNUTGROVE, MISSOURI.

SOUND-CONDUCTING HORN.

SPECIFICATION forming part of Letters Patent No. 715,237, dated December 9, 1902.

Application filed April 15, 1902. Serial No. 103,019. (No model.)

to all whom it may concern:

Be it known that I, GEORGE A. BALDWIN, a citizen of the United States, residing at Walnutgrove, in the county of Greene and State of Missouri, have invented certain new and useful Improvements in Sound-Conducting Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in horns for sound-reproducing machines, megaphones, and similar devices.

It has for its object to augment or diminish the volume of sound, according to the wishes of the listeners or requirements of the particular music, speech, or other sound which is being reproduced.

A further object is to improve the timbre or quality of the sound issuing from the horn.

Novel details in the arrangement and construction of the several parts of the invention will be apparent from the detailed description hereinafter and the appended claims, when taken in connection with the accompanying drawings, forming part hereof.

In the drawings, Figure 1 is a central longitudinal section. Fig. 2 is a cross-section on the line 2 2 of Fig. 1 looking in the direction of the arrow *x*. Fig. 3 is a like view looking in the direction of the arrow *y*.

Referring more particularly to the drawings, the horn is indicated at 4, being of the usual frusto-conical shape. Two diaphragms or partitions 5 and 6 are secured to the inner walls thereof at some distance apart. The intervening space W serves as a chamber or reservoir for a liquid, the purpose of which will be hereinafter described. The diaphragms are made, preferably, slanting toward each other and do not extend to the top wall of the horn, their height being about one-half the diameter of the horn at their respective positions. To the diaphragm 6 a gate 7 is hinged, as indicated at 7^a, which may be opened or closed by means of a hand-lever 8, fulcrumed to a

bracket 8^a, secured to the horn. The lever 8 is connected to the gate 7 by a rod 9. Suitable movement of the lever 8 will open or close the gate 7, and a stop 10 prevents excessive outward movement of the same. A fine-wire screen 11 is secured to the bottom wall of the horn within the space W. It is removed from the side and top walls of the horn to permit of its ready vibration.

In operation the sound entering the horn at A passes over the diaphragm 5 and out of the horn through the gate 7, which being capable of adjustment enables the volume of sound to be regulated. The space W between the diaphragms 5 and 6 is filled with water or other suitable liquid, in which the screen 11 is partly immersed. The sound in striking the diaphragm 5 and in passing over the water causes a vibration of the water and the screen, by which the volume of sound is greatly augmented and its timbre improved.

It will be understood that various minor changes in the details of the construction may be made without departing in the least from the spirit of the invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. The combination with a sound-conducting horn, of two diaphragms therein, and a liquid-chamber formed thereby.

2. The combination with a sound-conducting horn, of a liquid-chamber and vibratory screen therein.

3. The combination with a sound-conducting horn, of two diaphragms therein, a liquid-chamber formed thereby, and a vibratory screen in said liquid-chamber.

4. The combination with a sound-conducting horn, of two diaphragms therein, a liquid-chamber formed thereby, a vibratory screen in said liquid-chamber, a gate on one of said diaphragms, and means to operate said gate.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. BALDWIN.

Witnesses:

R. T. JONES,
C. G. KING.

No. 717,311.

Patented Dec. 30, 1902.

J. E. ALEXANDER.

RECORD OR RECORD BLANK FOR TALKING MACHINES.

(Application filed Nov. 2, 1900.)

(No Model.)

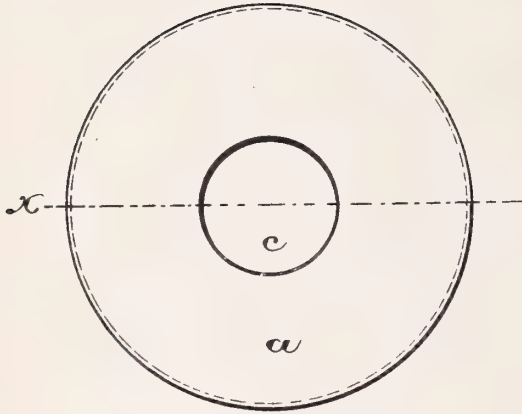


Fig. 1.

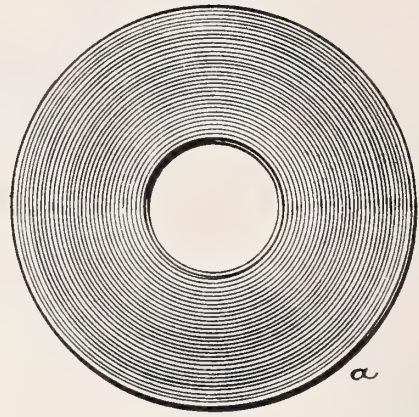
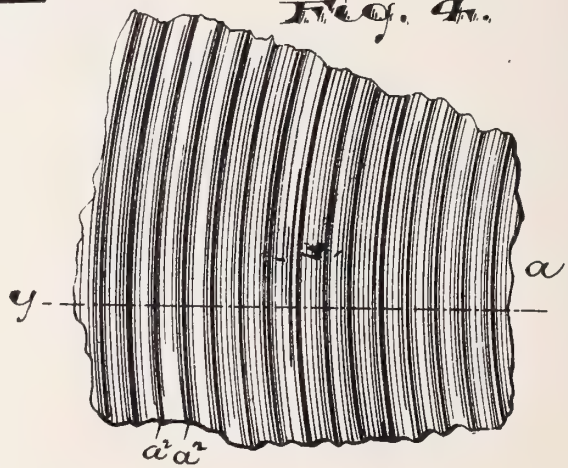
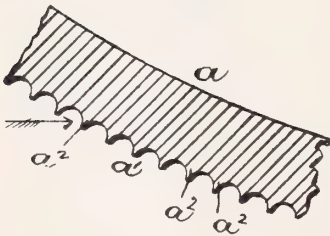


Fig. 2.



Fig. 3.

Fig. 4.



WITNESSES:

Henry Krug

Russell M. Everett

INVENTOR

John E. Alexander

BY

Drake & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN E. ALEXANDER, OF WEST ORANGE, NEW JERSEY.

RECORD OR RECORD-BLANK FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 717,311, dated December 30, 1902.

Original application filed September 28, 1900, Serial No. 31,357. Divided and this application filed November 2, 1900. Serial No. 35,233. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. ALEXANDER, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Records or Record-Blanks for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This case is a division of a case filed in the United States Patent Office September 28, 1900, Serial No. 31,357, and relates to the record for a talking-machine, and particularly such a machine as is shown in the original application filed on the date above stated.

The objects of the improved record are to enable a larger superficial area of reproducing cuts or engravings to be obtained, whereby a high rate of speed, and consequently a greater volume of sound, may be maintained without quickly terminating the period of sound reproduction; to secure a more durable and lasting record; to obtain a more perfect reproduction of sounds and more effectually avoid those tones which are unnatural to the voice or are not common to the musical instrument or other original-sound producer; to provide a record which can be compactly and securely packed for the market with ease and convenience, and to obtain other practical advantages and results, some of which may be referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved record or record-blank for talking-machines and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a plan of the improved record-blank having my improved construction. Fig. 2 is a plan of the same, showing it after

it has been engraved and ready for reproducing sound. Fig. 3 is a detail section on line *y* of Fig. 4 of the record on a greatly-enlarged scale. Fig. 4 is a plan showing a portion of the record on the same large scale, and Fig. 5 is a section on line *x* of Fig. 1.

In said drawings, *a* indicates the record-blank, comprising a body of wax or wax-like composition or other material capable of being engraved or receiving impressions due to the action of sound waves or vibrations either mechanically, chemically, or electrically or by any of the methods in the art of producing talking-machine records. Said body or blank *a* presents a broad basic portion at which it is seated on or is adapted to be attached to a suitable rotary holder. At or near said basic portion the said body is diametrically large or extends far from its center of rotation on its axial shaft or mandrel, and from its diametrically large basic portion the said body or blank is gradually reduced in radial distance of its surface from the axis of rotation, the lines of reduction being curved lines concentric with the center of lateral movement of its shaft, as hereinafter described. Said blank *a* is provided with a spherical surface *a'* or a surface resembling in conformation that of a sphere, in that the convex curvature of said blank is formed at all effective points at an equal radial distance from a given center. Said blank *a* is preferably a segment of a sphere and is centrally perforated, as at *c*, to receive a holder or a clamp-plate of the holder of the record-operating machine, whereby the blank or record can be easily and conveniently seated in operative relation in said machine substantially in the manner described in the case above referred to.

In the ordinary operation of the machine the blank rotates on an axial mandrel or shaft and the engraving-tool or the stylus or tracing instrument of the reproducer or of the speaker moving with its carrier on a fulcrum or axial center near or approximately at the axial center of the said mandrel or shaft describes a course concentric with the curvature of the record or blank, the said tool or tracer moving from the periphery of the record inward toward the center. Thus on the periph-

ery of the body *a* a spiral cut, groove, or engraving is formed extending from the larger peripheral part, where the larger spirals are formed, to the diametrically smaller part near the approximate apex or pole of the body, where the spirals are relatively smaller. In thus moving inward it may be observed that the stylus or tracing instrument bears laterally, as indicated by the arrow, against the partition-walls *a*², Fig. 3; but because of the convexity or variation in the diameter of the engraved surface the said instrument tends to wear not so directly against the thin partitions as heretofore, but into the body of the record, thus tending greatly to increase the durability of the said record, as will be understood.

I am aware that various changes may be made in the construction of the record without departing from the scope of the invention. For example, the said record may be made more or less completely globular in form and may be formed on a greater or less radius or may be relatively wider to enable a much greater expanse of surface engraving to be obtained, or the record may be conical in shape as distinguished from the true spherical shape without a departure from my invention.

Having thus described the invention, what I claim as new is—

1. A record for sound recording and reproducing machines having the form of a segment of a sphere not greater than a hemisphere whereby a broad base and tapering surface are secured.

2. A record for sound recording and reproducing machines, comprising a segment of a sphere taken wholly on one side of the center of the sphere.

3. A record for sound recording and reproducing machines, having the form of a segment of a sphere less than a hemisphere and

being centrally perforated to receive a record-holder.

4. A record for sound recording and reproducing machines, consisting of a segment of a sphere taken wholly on one side of the center of the sphere and being perforated perpendicular to its base to receive a holder.

5. A record for sound recording and reproducing machines comprising a segment of a sphere less than a hemisphere and having its base hollowed or recessed to afford space for the holding and motive mechanisms.

6. A record for sound recording and reproducing machines having the form of a segment of a hollow sphere not greater than a hemisphere, and providing an exterior record-surface and an interior space for holding and rotating means.

7. A record for sound recording and reproducing machines, consisting of a segment of a sphere taken wholly on one side of the center of the sphere and having a broad base and tapering exterior surface, and being hollowed or recessed at its base and centrally apertured to receive holding and rotating means.

8. A record for sound recording and reproducing machines, having the form of a segment of a sphere not greater than a hemisphere and presenting a broad base and tapering exterior surface, and having on said surface a spiral cut or groove the larger whirls of which lie near the base of the record and the smaller ones being formed successively nearer the apex or pole of the record.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of October, 1900.

JOHN E. ALEXANDER.

Witnesses:

W. H. WITHERS,
CHARLES H. PELL.

No. 717,953.

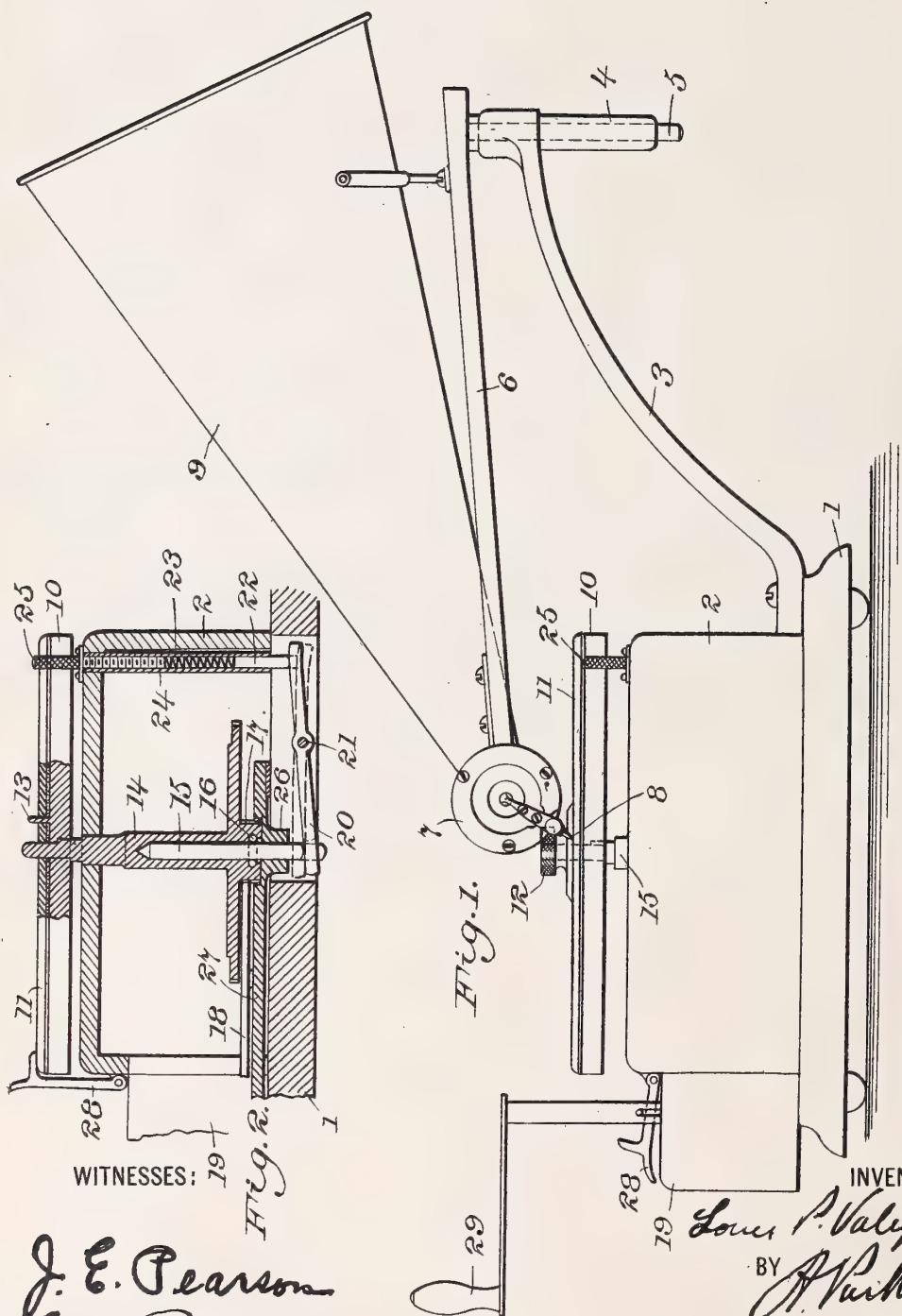
PATENTED JAN. 6, 1903.

L. P. VALIQUET.
TALKING MACHINE.

APPLICATION FILED DEC. 16, 1898.

NO MODEL.

2 SHEETS—SHEET 1.



J. E. Pearson
W. H. Humphrey.

INVENTOR
Louis P. Valiquet
BY
Attorney

No. 717,953.

PATENTED JAN. 6, 1903.

L. P. VALIQUET.

TALKING MACHINE.

APPLICATION FILED DEC. 16, 1898.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 3.

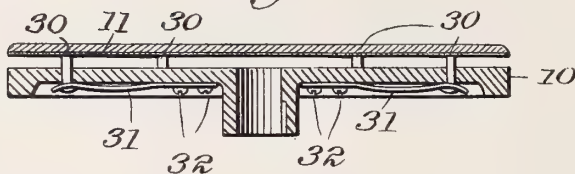


Fig. 4.

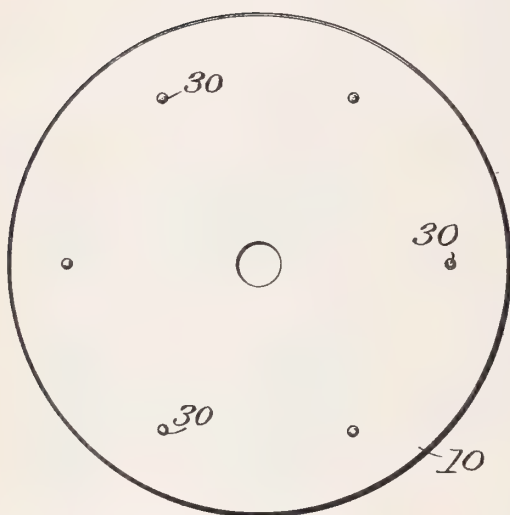
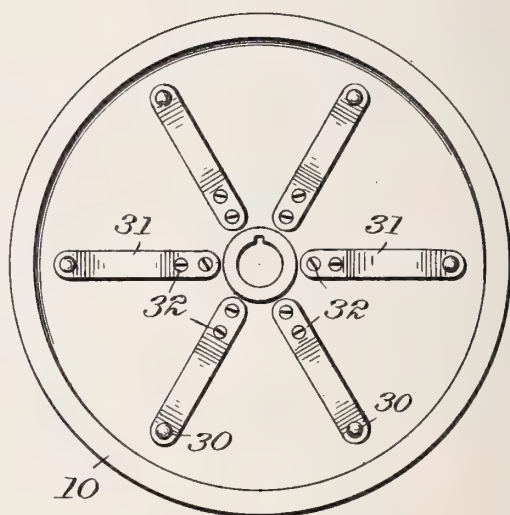


Fig. 5.



WITNESSES:

J. E. Pearson
N. H. Humphrey.

INVENTOR

Louis P. Valiquet

BY

A. H. Richmond

ATTORNEY

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 717,953, dated January 6, 1903.

Application filed December 16, 1898. Serial No. 699,429. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of New York city, county of New York, State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to talking-machines; and it consists of a novel method of procuring the necessary engagement and disengagement between the reproducing or recording style and the sound-record or the blank upon which said sound-record is to be inscribed.

Heretofore it has been customary to have the record or recording-blank rotate upon a fixed axis or spindle and to have the reproducer and reproducing-stylus or the reproducing-stylus alone adjustable to and from the surface of the record for the purpose of withdrawing the stylus from the record in removing and replacing the record or in returning the parts to their initial position after each operation of the machine.

In the particular kind of talking-machine known as the "gramophone" the reproducer has customarily been mounted upon an arm hinged to the main frame of the machine by a universal joint, so that the reproducer rested upon the record with its entire weight. The disadvantage of this is that the reproducer is liable to be dropped upon the record with a violent shock or allowed to drop upon the table upon which the instrument stands, thus creating a risk of damage or destruction both to the sound-record and the reproducer.

My invention overcomes this difficulty by mounting the reproducer upon a carriage or swinging arm movable only in a fixed plane, which plane should be parallel to the plane of the record if the latter is in the form of a disk, or parallel to the axis of the record if the latter is in the form of a cylinder. The necessary engagement of the record with the style and disengagement therefrom I secure by making the record itself adjustable to and from the recording-style and preferably mount the record or the record-carrying table or mandrel upon a spring or equivalent yielding mechanism.

The preferred form of apparatus embodying my invention is illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a side elevation of a gramophone to which my invention has been applied. Fig. 2 is a vertical central section through the record-carrying table and the spindle therefor. Fig. 3 is a central section through a modified form of record-carrying table, the record being shown in position thereon. Figs. 4 and 5 are top and bottom views, respectively, of the modification shown in Fig. 3.

Throughout the drawings like reference-figures refer to like parts.

The machine is mounted on base 1, having the casing 2, inclosing the running-gear, and an extension 19, inclosing the driving-spring. The arm 3 has an elongated bearing 4, in which the pivot 5 of the swinging arm 6 is journaled. The reproducer 7 is mounted on the end of the swinging arm 6 and carries the reproducing stylus or style 8. A rotating table 10 carries the disk-shaped sound-record 11, said sound-record being made of hard material which is unyielding to the stylus-point and held upon the table and caused to rotate therewith by means of the friction of the thumb-screw 12 or by means of an engaging pin 13. (See Fig. 2.)

The table 10 may of course be mounted on any kind of a vertical shaft or pivot; but I prefer to mount it, as shown at Fig. 2, on a vertical sleeve 14, supported by cone-bearing on the upper end of the vertical pivot-shaft 15 and having the ball-bearing 16 against the flank of said vertical shaft. The sleeve 14 has a wide-faced pinion 17, meshing with the driving-gear 18, which latter is driven by any suitable gearing from a spring-motor in the extension-casing 19, which spring-motor I have not illustrated. The pivot-shaft 15 is vertically adjustable in the boss 26 on the bed-plate 27, and the lower end of said pivot-shaft rests on any suitable yielding and adjustable support. I have illustrated as a preferred form of such support a lever 20, pivoted at 21 and having its right-hand end (see Fig. 2) forced down by the plunger 22, upon which a graduated pressure is brought by

means of the spiral spring 23 and thumb-screw 25. The thumb-screw 25, spring 23, and plunger 22 are kept in line by the sleeve 24, within which they work.

5 Any suitable horn or sound-conveying tube 9 is connected to the sound-box 7 and carried by the swinging arm 6.

A hinged catch 28 is provided at one side of the casing 2 and is so adjusted as to take 10 over the table 10 and record 11, or over the table alone, and hold the table down in one of its lower positions.

Any form of key or winding-crank 29 may be used for winding up the spring-motor.

15 The operation of my invention is as follows: The spring-motor being wound up and the catch 28 being disengaged, the mechanism will cause the sound-record 11 to rotate, and the spring 23 will cause the lever 20 to force 20 up the spindle 15 and with it the table 10 and record carried thereon, so that the sound-record will be held in engagement with the reproducing-style 8. The style will be vibrated by the undulatory groove in the sound- 25 record, and the recorded sound will be reproduced in the sound-box 7 and delivered through the horn 9. As the record rotates the spiral groove will slowly feed the sound-box over, the arm 6 swinging upon its pivot 5.

30 When the end of the record is reached, the table is forced down by the operator and out of engagement with the stylus 8, the latter being held up by the arm 6. The catch 28 is then thrown up to engage the table, as shown 35 in Fig. 2, and the reproducer may be swung to one side. The record 11 may be removed and another one substituted. The reproducer is then swung back over the record and adjusted at the beginning thereof, the 40 catch 28 thrown back in the position shown in Fig. 1, and the machine will then start into operation. The degree of force with which the record is pressed against the reproducing-style will be controlled by adjusting 45 the thumb-screw 25. If purity of tone is desired with an absence of all scratching sound, the thumb-screw 25 is turned so as to withdraw the screw and lessen the compression of the spring 23. If greater volume of tone is

50 desired, the thumb-screw is turned in the opposite direction, so as to increase the compression of the spring and the consequent pressure with which the record is held against the reproducing-style. This forces the style 55 farther into the record-groove, makes the vibrations of the style ampler and more positive, and gives a greater volume of tone, although accompanied by a slight increase of the scratching sounds produced by friction 60 of the style upon the material of the record.

In the modifications shown in Figs. 3, 4, and 5 the form of table now in use is shown, designed to be mounted on a non-adjustable vertical shaft, and the adjustment of the record is secured by mounting it on a series of 65 little plungers 30, &c., mounted in the table itself and supported by springs 31 31, &c. Ad-

justment of these springs is secured through manipulation of the screws 32 32.

The advantages of my invention are evident in that the reproducer is securely supported at all times, while at the same time it is free to move through a plane parallel to the record, and thus be fed along by said record or swung to one side for purposes of 70 changing the records. At the same time the record can be promptly brought into or out of engagement with the reproducing-style at the will of the operator and held out of engagement by means of the catch 28. This 75 catch also operates as a brake on the revolving table, and by throwing it out of engagement the one motion brings the record into engagement with the style and releases the driving mechanism, so that the machine begins to talk. By adjusting the compression 80 of the spring 23 different styles of sound reproduction can be secured, as above described.

It is evident that various changes could be made in the apparatus disclosed without departing from the spirit and scope of my invention, so long as the principle of operation 90 above described is retained. The same adjustments would be operative in a machine in which the record was other than disk- 95 formed or in which the plane of movement of the reproducing-style was other than horizontal. Weights might be substituted for springs in producing the pressure holding the record in engagement with the style, and other 100 mechanism for supporting and rotating the record-table might be employed. The reproducer might be carried on a different form of carriage from the swinging arm shown, &c. All these deviations I consider to be in form 105 merely and not in substance, and all are within the scope of my invention.

Having therefore described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a talking-machine the combination of a reproducing-stylus movable in one fixed plane only, and a flexibly-mounted sound-record of rigid material coöperating therewith, 110 substantially as described.

2. In a talking-machine the combination of the reproducing-style movable in a horizontal plane, the sound-record rotating on a vertical axis, and mechanism for forcing the sound-record toward the reproducer with 115 yielding pressure, substantially as described.

3. In a talking-machine the combination of the reproducer movable in a fixed plane only, the sound-record coöperating therewith and having that portion of its surface in contact with the reproducer-style at any one moment movable in approximately the same plane as that in which the reproducer moves, and mechanism which forces said record toward the reproducer-style with yielding pressure, 120 substantially as described.

4. In a talking-machine the combination of the reproducing-style movable in a fixed plane only, the disk-shaped sound-record ro- 125

tating on an axis perpendicular to said plane, and adjustable spring mechanism for forcing the record toward the style, substantially as described.

5 5. In a talking-machine the combination of the reproducing-style movable in a fixed plane only, the disk-shaped sound-record rotating on an axis perpendicular to said plane, and adjustable spring mechanism for forcing
10 the record toward the style, together with a catch mechanism for holding the record out of engagement with the style, substantially as described.

6. In a gramophone, a vertically-adjustable
15 spindle for the rotating record-table, together with a yielding support for said spindle, substantially as described.

7. In a gramophone, a vertically-adjustable spindle for the rotating record-table, together
20 with a yielding support on which the spindle rests, and a catch for holding said record-table down in its lower position, substantially as described.

8. In a gramophone, a vertically-adjustable
25 spindle for the rotating record-table, together with a yielding support on which the spindle

rests, and mechanism for adjusting said yielding support, substantially as described.

9. In a sound recording and reproducing machine a record, means for rotating the
30 same, a sound-box provided with a diaphragm and style, and yielding supporting devices for bringing the record-disk into engagement with the style.

10. In a sound recording and reproducing
35 machine, a rigidly-mounted reproducer, a yieldingly-mounted record, and means for keeping the grooves of the record in contact with the style of the reproducing mechanism for the purpose stated.

11. In a sound-reproducing machine, a reproducer mounted rigidly in a direction normal to the record and a support for the record mounted to yield in the same direction
45 during reproduction.

Signed by me at New York city this 14th day of December, 1898.

LOUIS P. VALIQUET.

Witnesses:

A. PARKER-SMITH,
LILIAN FOSTER.

No. 718,073.

W. BARNES.

PATENTED JAN. 13, 1903

SUPPORT FOR HORNS FOR TALKING MACHINES.

APPLICATION FILED SEPT. 24, 1902.

NO MODEL.

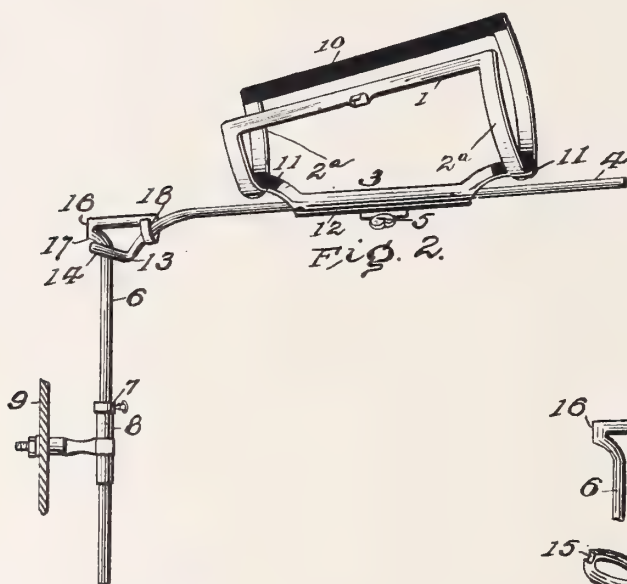
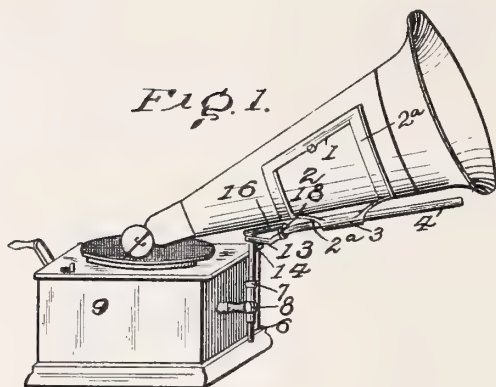
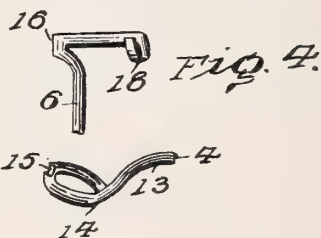
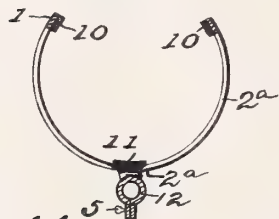


FIG. 3.



Witnesses

D. W. Gould.

W. R. Rind-

By

Charles M. Cattin

Inventor

Walter Barnes,

Attorney

UNITED STATES PATENT OFFICE.

WALTER BARNES, OF TOLEDO, OHIO.

SUPPORT FOR HORNS FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 718,073, dated January 13, 1903.

Application filed September 24, 1902. Serial No. 124,692. (No model.)

To all whom it may concern:

Be it known that I, WALTER BARNES, a resident of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Supports for Horns for Talking-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to adjustable supports for horns for talking-machines.

The main object of the invention is to provide improved supporting devices for talking-machine horns or for other analogous devices.

In the drawings, Figure 1 is a perspective view of a talking-machine with the improved horn-support. Fig. 2 is a perspective view of the support detached from the machine. Fig. 3 is a sectional view of the cradle, showing rubber pieces on the inside thereof. Fig. 4 is a detail view of the lock-joint for the cradle-arm.

In all the figures of the drawings, 1 represents the sheet-metal cradle in which the reproducing-horn 2 may rest.

3 is the curved flange or connecting member, in which the cradle terminates at the bottom between the curved spring ends 2^a, the cradle-arm 4 passing through the opening in the downwardly-curved tube-like flange and being fastened by a thumb-screw 5.

6 indicates the adjustable standard for supporting the horn.

7 indicates an adjustable shoulder or collar by which the height of the standard is regulated.

8 indicates a T-shaped socket through which the standard 6 passes and which is fastened to the machine-cabinet 9.

The inner surface of the two top longitudinal pieces of the cradle are lined with thin strips of rubber 10, and there are small pieces of rubber 11 at the bottom of the cradle at the two points where the horn rests. This rubber lining and these rubber rests help to grasp the horn more securely than the metal cradle alone would do. The inner edges of the bottom of the cradle are connected by an intermediate arm 12, curved into a tube-like shape, so that there is a receptacle through which the cradle-arm 4 passes, the thumb-

screw 5 holding it in place. The cradle-arm terminates with a curve 13 and with a circle 14 on its lower end. On the top of the circle in the center is cut a shallow slot or notch 15, in which the point 16 of the top of the standard rests at 17 when the support is in use.

The adjustable standard is inserted perpendicularly through the T-shaped socket 8 and terminates at the top with a sort of a triangular-shaped reverse point 16, a part running thence forward to the cradle-arm and terminating with a hook, eye, or ring 18, grasping the cradle-arm. The standard is also passed through the ring in the end of the cradle-arm in such a manner that the triangular point shall rest in the slot or notch 15 in one side of the ring with which 4 terminates. The shoulder or collar 7 is furnished with a thumb-screw, whereby the standard may be elevated or lowered at pleasure. The socket 8 is made T-shaped to prevent wobbling of the standard when the machine is in operation. The shoulder or collar 7 should be formed loosely enough so that the cradle-arm and the standard may be pushed together when not in use, so that the same will occupy less space in the packing-case, as shown in my application of even date herewith on cases for talking-machines, Serial No. 124,693.

Some of the advantages of the device described above are as follows: The spring-cradle will fit and grasp any size of reproducing-horn. The rubber lining and strips referred to in the description will not only prevent the horn from turning, but will largely do away with the metallic sound that accompanies the reproduction of sound with the ordinary arm and reproducing-horn of talking-machines. The edges of the horn may be secured together by connecting devices, as hooks 22; but this is not essential, especially if the horn is large. The attachment of a thumb-screw on the lower part of the cradle, fixing the cradle to the main arm or cradle-rest, allows the rest to be either elevated or shortened, according to the size of the horn used. This does away with the horn stand or support commonly used.

An important feature of the device is the lock-joint, (the point where the standard and the cradle-arm join.) The reproducer 20 has

a perpendicular as well as a horizontal motion, so that the sound-box and stylus are allowed to follow the record or sound waves without destroying or injuring the record, the weight of the reproducer being almost altogether carried by the standard. Not only can the standard be adjusted by manipulating the adjustable shoulder or collar, allowing the cradle-horn to be placed at any height desired or made necessary by size of horn used, but through it the pressure put upon the needle-point of the reproducer can be limited as desired. By making the parts of the lock-joint as indicated the device can be closed together longitudinally and moved approximately into line with the arm when not in use, so that it will occupy less space and can be packed for carrying with greater facility.

Another advantage of the lock-joint embodied in this device is that it holds the reproducing-horn securely, thus preventing the same from being accidentally thrown out of place or thrown out of balance.

I may use the described lock-joint between the standard and the supporting-arm otherwise without departing from my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A horn-supporting cradle having spring parts adapted to grasp a horn, elastic pieces on its inner side, whereby the horn is firmly held and kept from direct contact with its support.

2. A horn-supporting cradle having curved spring ends adapted to grasp a horn, upper connecting members between said ends, said members being lined with rubber, and rubber pieces in the lower parts of said curved ends, whereby the horn is kept from direct contact with its support.

3. The combination of a supporting-cradle having curved ends and a bottom connecting member between said ends, and formed into tube-like shape, and a supporting-arm extending through said member.

4. The combination of a supporting-cradle having curved ends and a bottom connecting member between said ends, and formed into tube-like shape, and a supporting-arm extending through said member, and means, as screw 5, for securing said arm and member together.

5. The combination of a standard having at one end a reverse point 16, a part extending therefrom forward and terminating in an eye, a supporting-arm extending through said eye and terminating in a ring surrounding the standard just below point 16, the upper side of said ring having a notch adapted to receive point 16, forming a lock-joint.

6. The combination of a standard having at one end a reverse point 16, a part extending therefrom forward and terminating in an eye, a supporting-arm extending through said eye and terminating in a ring surrounding the standard just below point 16, the upper side of said ring having a notch adapted to receive point 16, forming a lock-joint, and a horn-supporting cradle fixed on the supporting-arm.

7. The combination of a standard having at one end a reverse point 16, a part extending therefrom forward and terminating in an eye, a supporting-arm extending through said eye and terminating in a ring surrounding the standard just below point 16, the upper side of said ring having a notch adapted to receive point 16, forming a lock-joint, and an adjustable collar on said standard.

8. The horn-supporting cradle having curved ends, a lower connecting and supporting tube-like member, and upper members between said ends, and connecting devices on said upper members.

9. The combination of the cabinet, the part 8, the standard, the supporting-arm, there being a lock-joint between said standard and arm holding the latter from accidental swinging, and a cradle on the arm.

10. The horn-supporting cradle, the supporting-arm, the standard, the lock-joint between said arm and standard holding them at approximately right angles to each other when in use, said joint being loose, whereby the standard can be moved approximately into line with the arm and longitudinally thereof to save space in packing.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER BARNES.

Witnesses:

CLEM V. WAGNER,
L. M. WILLIAMSON.

No. 718,074.

PATENTED JAN. 13, 1903.

W. BARNES.

ELBOW FOR TALKING MACHINE HORNS.

APPLICATION FILED SEPT. 24, 1902.

NO MODEL.

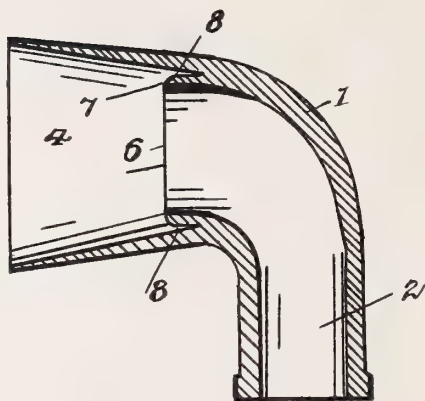


Fig. 1.

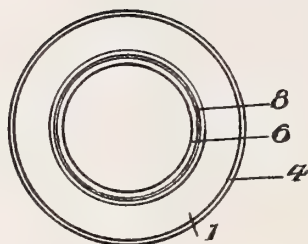


Fig. 2.

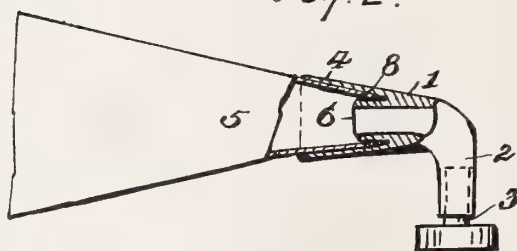


Fig. 3.

Inventor

Walter Barnes

Witnesses

Benj. R. Badier
D. W. Gould.

By

Charles M. Catlin

Attorney

UNITED STATES PATENT OFFICE.

WALTER BARNES, OF TOLEDO, OHIO.

ELBOW FOR TALKING-MACHINE HORNS.

SPECIFICATION forming part of Letters Patent No. 718,074, dated January 13, 1903.

Application filed September 24, 1902. Serial No. 124,694. (No model.)

To all whom it may concern:

Be it known that I, WALTER BARNES, a resident of Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Elbows for Talking-Machine Horns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

The invention relates to means for connecting the sound-box of a talking-machine to the smaller end of a metal horn, such as generally used in such machines.

The main object of the invention is to provide an improved elbow or body for the purpose mentioned.

In the accompanying drawings, illustrating the invention, Figure 1 is a central longitudinal section of the improved shoulder. Fig. 2 is an end view thereof looking toward the flaring end. Fig. 3 is a view, on a smaller scale, showing the shoulder in place between a sound-box and a horn.

The improved elbow 1 is made, preferably, of medium-grade soft rubber and is formed in one integral body, comprising a tubular part 2, of proper size to receive the projecting tube 3 of a talking-machine sound-box, and the flaring part 4, preferably decreasing in thickness toward its larger end and adapted to receive snugly within it the smaller correspondingly-tapering end of the horn 5. Said elbow also has an inner tubular extension 6, adapted to fit snugly into the inside of said smaller end of the horn. This extension 6 is the important part of my invention. The outer edge 7 of the extension is curved or beveled to insure easy entrance of the end of the horn into the annular groove 8 between parts 4 and 6.

Owing to the forms of parts 4 and 6, the annular groove between them grows narrower toward its bottom, whereby the inserted end of the horn will fit into it tightly. Being of

rubber, the elbow clings to the horn and prevents the latter falling out. The horn, supported in the elbow, as described, is held by the rubber pressing against it both on its inner and its outer sides, and this lessens disturbing vibrations of the horn, as the inner extension 6 prevents the sound-waves from the reproducer striking the end of the horn. The disagreeable metallic sounds often heard in talking-machines are largely reduced by my improvement.

While the groove described is shown as tapering toward its bottom, this is not essential. The form of the elbow may be varied in shape, but must retain the inner extension adapted to prevent the sound-waves from striking the small end of the horn fitting within the end of the elbow.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A sound-box and horn-connecting elbow one end of which is adapted to receive the tube of a sound-box, the other end being adapted to receive the small end of a horn, said elbow having an inner extension, separated from the horn-receiving portion by an annular groove adapted to receive the smaller end of the horn.

2. A sound-box and horn-connecting elbow of rubber one end of which is adapted to receive the tube of a sound-box, the other end being adapted to receive the smaller end of a horn, said elbow having an integral inner extension, separated from the horn-receiving portion by a tapering annular groove adapted to receive the smaller end of the horn.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WALTER BARNES.

Witnesses:

CLEM V. WAGNER,
L. M. WILLIAMSON.

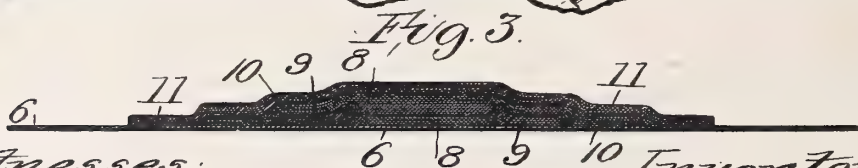
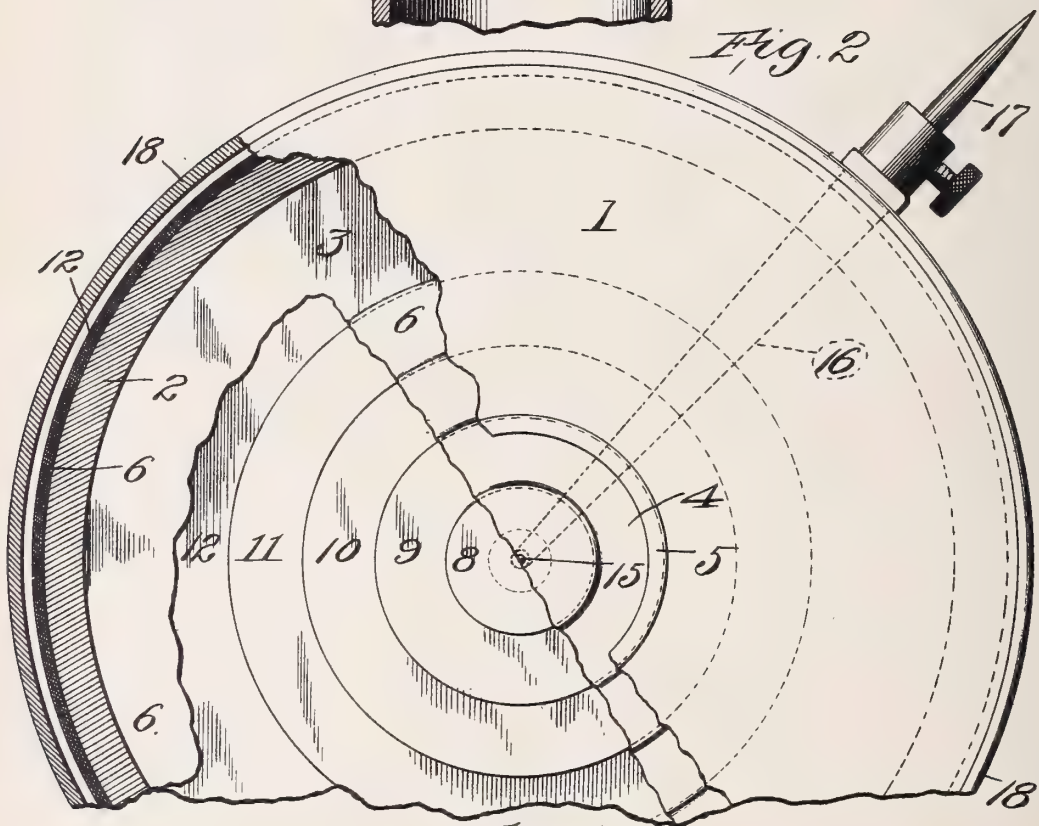
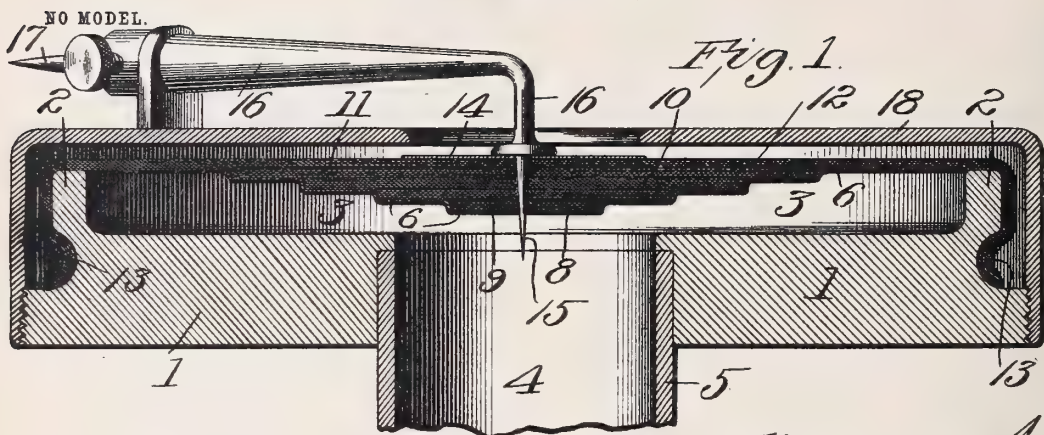
119.261,

No. 719,361.

PATENTED JAN. 27, 1903.

W. B. OUTTEN.
SOUND BOX.

APPLICATION FILED JUNE 2, 1902.



Witnesses:

W. H. Scott.
G. A. Pennington

Inventor
Warren B. Outten,
by *Bakewell & Cornwall*
Attys.

UNITED STATES PATENT OFFICE.

WARREN B. OUTTEN, OF ST. LOUIS, MISSOURI.

SOUND-BOX.

SPECIFICATION forming part of Letters Patent No. 719,361, dated January 27, 1903.

Application filed June 2, 1902. Serial No. 109,924. (No model.)

To all whom it may concern:

Be it known that I, WARREN B. OUTTEN, a citizen of the United States, residing at St. Louis, Missouri, have invented certain new and useful Improvements in Diaphragms, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an enlarged sectional view through my improved sound-box. Fig. 2 is a fragmentary inverted plan view, and Fig. 3 is a sectional view illustrating the manner of building up the diaphragm.

This invention relates to a new and useful improvement in diaphragms for transmitting sound and is adapted for use in connection with phonographs, graphophones, gramophones, telephones, stethoscopes, auscultators, and other devices wherein diaphragms are vibrated to transmit sound-waves.

The object of the invention is to produce a device of the character described which will transmit sound-waves approximating in volume more nearly the original sound-waves than any instrument of similar character heretofore made and on the market with which I am familiar.

Being useful in connection with so many sound-wave transmitters, it will be obvious that slight modifications can and undoubtedly will be made to accommodate my invention to the various uses for which it may be employed.

This invention consists in the arrangement of the diaphragms, which diaphragms are preferably composed of animal membrane containing muscular tissues or fibers which approximate the muscular structure of the ear-drum secured by an adhesive substance, whereby tense radiating lines are formed to overcome the dormant areas in said diaphragms. While I have employed animal membrane in devices of this character which I have constructed and obtained excellent results, yet it may be that there are other materials which can be employed with good results, and therefore I do not wish to be understood as limiting myself specifically to the materials hereinafter mentioned, nor to the

treatment thereof by any particular ingredients, as it is obvious that there are numerous ingredients which can be used in connection with the diaphragms without in the least departing from the nature and principle of my invention.

In the drawings, 1 indicates a box or housing provided with a flange 2, forming, with the diaphragm stretched thereover, an internal sounding-chamber 3, connected with the exterior by an opening 4 in the stem or tube 5, extending rearwardly from the body portion 1.

6 indicates a diaphragm of some principal or foundation membrane, such as goldbeaters' skin, preferably of one thickness, which is stretched over the flange 2 and secured in position while tense in some suitable manner—such, for instance, as a cord or wire engaging the ends thereof and burying said edges in the annular groove in the outer face of the flange 2. This diaphragm may be stretched while wet or green, so that upon drying it will become tense or taut. In the center of this diaphragm and preferably on the outer surface thereof I secure, by means of a suitable mucilaginous substance, a disk 8, said disk being preferably composed of a number of thicknesses of goldbeaters' skin stuck together. This disk will place the diaphragm 6 under greater tension, due to the drawing or pulling action of the securing medium for the disk to the diaphragm, and will also form what I will term "tense" radiating lines, which serve to concentrate the vibrations of the diaphragm to a central point. This I have found to be important in that the liability to the formation of dormant areas is lessened, which dormant areas might otherwise exist in the diaphragm and tend to neutralize the vibrations thereof. Flange 2 is for this reason preferably circular in order that this pull may be evenly distributed throughout the surface of the diaphragm, and this disk 8 is centrally located relative to the attachment of the edges of the diaphragm to the flange. When the adhesive substance which secures the disk 8 to the diaphragm 6 has become dry and has produced these tense radiating lines before described, another disk 9, of larger diameter than the disk 8, is secured by adhesive substance to the outer face

of disk 8, the marginal edges of the larger disk 9 being pressed firmly onto the diaphragm 6, to which said marginal edges become attached. This second disk acts in the same way as the first—to wit, it produces these tense radiating lines before referred to and draws the diaphragm 6 more tightly and considerably reduces the liability to the formation of dormant areas. When the adhesive substance which secures the disk 9 has become dry, another disk 10, of larger diameter than the disk 9, is attached to the outer face thereof, the marginal edges of disk 10 being secured to the diaphragm 6. The adhesive substance used in applying this disk 10 in position is allowed to dry, as before described, and this disk acts in the same way as the others heretofore described in reducing the dormant areas and more tightly stretching the diaphragm 6. In the drawings I have shown a fourth disk 11 applied in position over the disk 10 and with its marginal edges secured to the diaphragm 6. This fourth disk 11 acts in the same manner as the disks before described, and when in position there is still left a clear space between the margin thereof and the flange 2. All of the disks 8, 9, 10, and 11 are each preferably composed of a number of layers of goldbeaters' skin cut to the proper shape and adhered together, the adhesive substance being wet slightly at the time the disks are applied in order that they may be readily pressed into the proper shape, said disks drying or at least partially drying when in the desired position. I have produced very good results by using from ten to fifteen layers of goldbeaters' skin in the construction of these disks. After the disks are applied as above described, which application is shown in Fig. 3, I then take a number of layers of goldbeaters' skin and after treating them with a solution hereinafter described apply them wet over the disks, securing the successive layers by the use of some adhesive substance to the flange 2 in some suitable manner. These last-mentioned diaphragms are applied one after another until an outer diaphragm having from ten to fifteen layers of goldbeaters' skin is in position, when the cord or wire is used to embed the edges of all of the diaphragms in the groove before referred to. In the drawings I have indicated this outer diaphragm composed of a number of layers by 12 and the embedding wire by 13.

14 indicates a metal disk which is applied centrally with respect to the diaphragm 12 by means of some adhesive substance. This disk is provided with an opening in its center for the reception of a pointed pin or projection 15 on the end of the needle-post 16. If desired, the diaphragms and disks may be punctured centrally before being applied in position to receive this pin, said pin serving to hold the needle-post firmly in place, thus avoiding the use of beeswax or other substance commonly

employed to secure the needle-post to the diaphragm.

17 indicates the stylus, which is secured in the needle-post, shown in this instance as a reproducing-stylus. It is obvious that where the sound-box is to be used in connection with recording and reproducing sound post 16 may also be constructed to carry a cutting-stylus.

18 indicates a casing or shell which is employed to protect the diaphragm for well-understood purposes.

Before using goldbeaters' skin in my improved sound-box it is desirable to treat the same so as to render the texture thereof more compact and at the same time prevent the volatilization of all moisture which would tend to destroy the flexibility and efficiency of the diaphragm. The composition I have used and found to answer is made up as follows: two ounces liquid glass, one ounce glycerin, one-half ounce oil of resin, two drams chlorid of cobalt, and enough water added to make a mixture of twelve ounces. The liquid glass is employed to preserve a certain amount of moisture lent to the mixture by the non-volatile and solvent glycerin. The oil of resin acts as a drier and also as a bond for the other ingredients, while the chlorid of cobalt is used as a preservative and germicide.

For purposes of distinction I will term the diaphragm 6 the "inner" diaphragm and will state that, if desired, it can be composed of several layers and I will term the diaphragm 12 the "outer" diaphragm.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a diaphragm composed of animal membrane, of a circular support therefor, a disk which is secured to the center of said diaphragm by an adhesive substance, whereby said disk draws said diaphragm toward a central point to form tense radiating lines to overcome dormant areas in said diaphragm, and a second disk placed in position over the first-mentioned disk and having marginal contact with the diaphragm beyond said first-mentioned disk, for drawing said diaphragm toward a central point to increase the tensility thereof; substantially as described.

2. A diaphragm for the purposes described treated with liquid glass, glycerin, and oil of resin; substantially as described.

3. A diaphragm for the purposes described treated with liquid glass, glycerin, oil of resin and chlorid of cobalt; substantially as described.

In testimony whereof I hereunto affix my signature, in the presence of two witnesses, this 30th day of May, 1902.

WARREN B. OUTTEN.

Witnesses:

GEORGE BAKEWELL,
G. A. PENNINGTON.

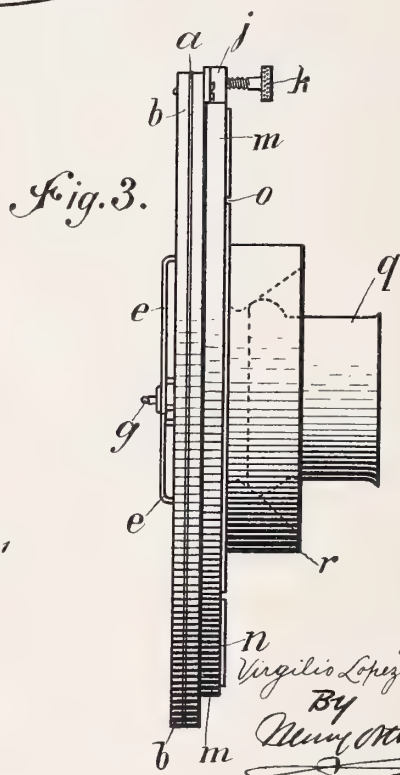
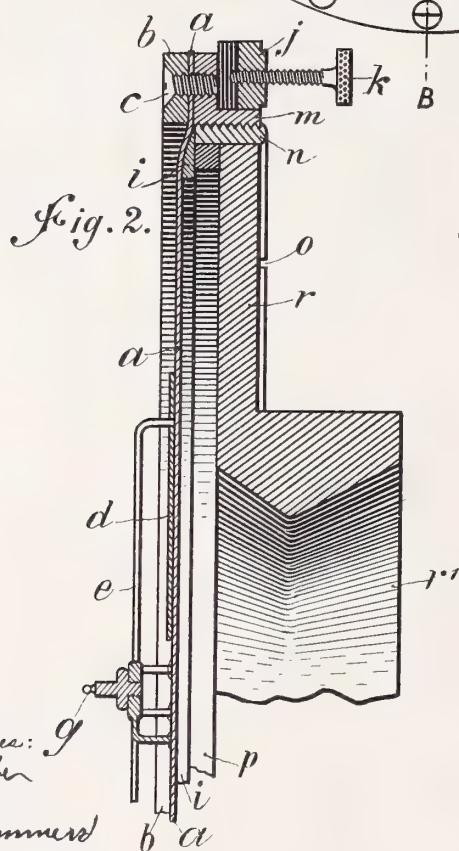
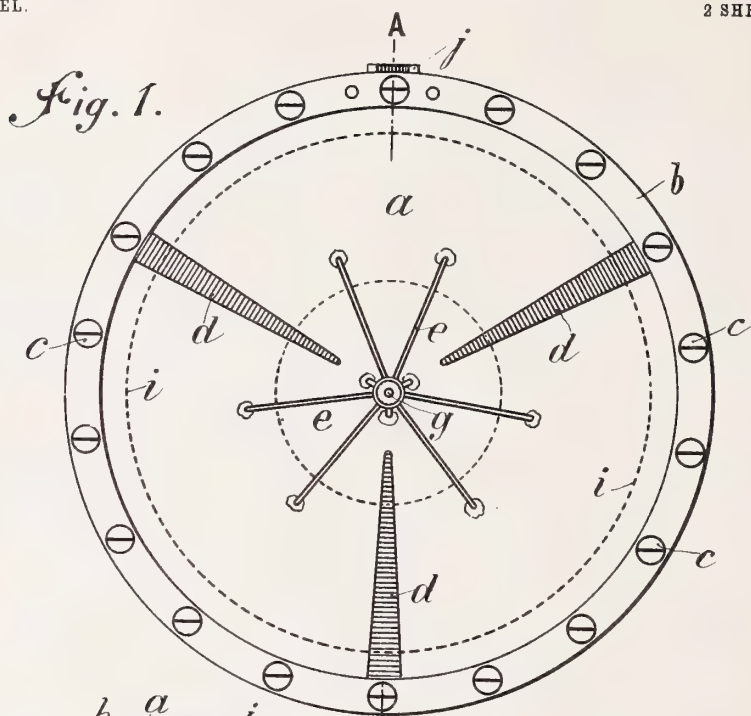
V. L. GARCIA.

VIBRATORY MEMBRANE FOR PHONOGRAPHS.

APPLICATION FILED FEB. 28, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses: *J*
Baker
W. Summers

In *Inventor*
Virgilio Lopez Garcia
By
Mary M. J. J.

Steps

No. 720,127.

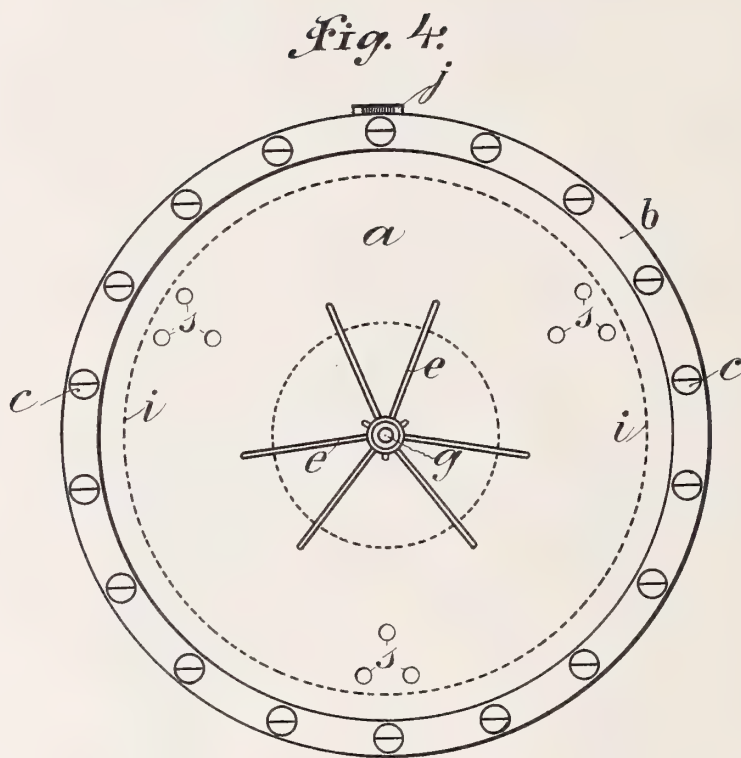
PATENTED FEB. 10, 1903.

V. L. GARCIA.
VIBRATORY MEMBRANE FOR PHONOGRAPHS.

APPLICATION FILED FEB. 28, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
Attest
W. L. Summers

By *Vigilio Lopez Garcia* *Inventor.*
Mary Orthofer
Atty.

UNITED STATES PATENT OFFICE.

VIRGILIO LOPEZ GARCIA, OF BUENOS AIRES, ARGENTINA.

VIBRATORY MEMBRANE FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 720,127, dated February 10, 1903.

Application filed February 28, 1902. Serial No. 96,126. (No model.)

To all whom it may concern:

Be it known that I, VIRGILIO LOPEZ GARCIA, civil engineer, a citizen of Argentina, residing at No. 745 Calle Tucuman, in the city of Buenos Aires, Argentina, have invented new and useful Improvements in Vibratory Membranes for Phonographs, of which the following is a specification.

The membranes that have been used heretofore in phonographic apparatus have a comparatively small diameter, the largest, used by Bettini, measuring only .05 meter in diameter. The reason for not employing large membranes is that the sound-waves that they produce interfere and destroy the fundamental tone, so that the advantage of a larger diameter to produce waves of greater amplitude was negated.

Now the purpose of this invention is to produce a membrane in which the greater part of the interfering waves are eliminated.

The simplest relation between sounds is when they have the same number of vibrations, thereby producing unison, and when simultaneously sounded will produce a sound of double intensity if in phase and when successively sounded produce a continuous sound. In a membrane that receives four impulses at the same time and of equal intensity and velocity there will be four different centers of vibration to send out interfering sound-waves, and there will be more or less alteration in the sound. It will be readily understood that the membranes of phonographic apparatus may be so connected to the reproducing-style to give two or more centers of vibration simultaneously moved by the style actuated by the impressions in the record-cylinder. Consequently experiment must be made with membranes differing in dimensions in order to find out the most convenient form to be given to the connecting-link to give two or more centers of vibration in the diaphragm that will give the maximum of concordant interference or harmonious relations. This is readily done by causing the membrane to vibrate while covered with a thin layer of fine sand or colored water, when the zones of vibration will be clearly defined, as well as the nodes. It is very important to know the tone of the membrane itself, as such membrane will better reproduce sounds of similar tone.

Each membrane of different dimensions or material will have its special connecting-link to the stylus situated in accordance with the interference produced and the tone of the membrane itself. There will be membranes which comprehend a limited series of sounds, according to the kind or class of vibration that they produce—that is to say, that within such limits the reproduction of the sound will be perfect. A good phonographic apparatus must therefore be provided with three or four different membranes, at least, which comprehend within their kind of vibration the greatest possible number of different sounds.

Referring to the accompanying drawings, in which like parts are similarly designated, Figure 1 shows an under side view of the membrane adjusted in its stretching-frame. Fig. 2 is a transverse section on the line A B, Fig. 1. Fig. 3 is a side view of the drum with the diaphragm therein, and Fig. 4 is a modification.

In the diaphragm *a*, preferably, but not necessarily, made of mica, I calculate six zones of vibration, three of which are contrary or out of phase, the action of which latter is substantially destroyed by means of plasters or strips or pieces of a paper *d* or other substance capable of damping or entirely destroying the vibrations in the diaphragm at these points, while the three concurring zones, or those whose vibrations are in phase, are connected to the stylus *g* by the links *e*, that form a spider and are connected to the smaller central spider *e'*. The maximum of vibration will be at the center of the diaphragm, which is connected to the stylus *g* by a small spider *e'*.

The drum or stretching-frame, which may be separated from the membrane, consists mainly of two metallic collars or frames of the same diameter *b* and *m*, the latter being provided with a tapped flange *m'*. Between the frames *b* and *m* the membrane *a* is placed and fixed in position by means of the screws *c*. In order to stretch the membrane, a metallic liner *i* is introduced inside of the frame *m*, so that the same rests on the membrane. A tapped collar *n* is then screwed into the said frame *m*, by which the liner *i* will be fixed in its place to uniformly stretch the membrane. In order to adjust the tapped collar *n*, this

has been provided at its upper edge with slots
o, in which a knife or other instrument may
 be introduced for guiding the said collar.
 The air-chamber of the drum is formed by
 5 the space existing between the membrane
 and the wooden cover *r*. In order to form
 such air-chamber, a rubber cord *t* is placed
 around the tapped collar *n*, and on the ad-
 justing-ring *i* to form a tight seat is mounted
 10 the cover *r'*, that is provided with the socket
r', in which the ball *q* for the horn rests.

While effecting different experiments, I
 have discovered that by extinguishing the
 discording zones by means of perforations or
 15 holes in the membrane a clearer and more
 united sound is produced. This increased
 clearness of the sound is doubtless owing to
 the outlet which the said perforations offer to
 the air inclosed in the chamber. In effect
 20 the air inclosed in the chamber when vibrat-
 ing in accordance with the membrane con-
 stantly tends to extinguish by its own vibra-
 tion those of the membrane. It is therefore
 necessary to construct the said air-chamber
 25 as small as possible; but owing to these per-
 forations, located precisely within the dis-
 cording zones, these zones will not only be
 extinguished—that is to say, interference will
 be eliminated—but also an outlet will be given
 30 to the air of the air-chamber, the shocks of
 which diminish the intensity of the sound of
 the membrane.

Fig. 4 shows a plan view of a membrane
 similar to that represented in Fig. 1, but in
 35 which the discordant zones have been extin-
 guished by means of perforations. In this
 case the cover should be of spherical shape in
 order to enlarge the air-chamber and the rub-
 ber cord should not be employed.

40 Having thus described my said invention,
 what I claim as new therein, and desire to se-
 cure by Letters Patent, is—

1. In a phonographic reproducing device,
 the combination with a suitable diaphragm
 45 and its supporting-frame, of a stylus con-
 nected to the diaphragm where there is maxi-
 mum vibration, auxiliary connections be-
 tween the diaphragm and stylus at a distance
 from the center at points of concordant inter-
 50 fering vibration, means at points of discord-
 ant vibration to annul the latter, substan-
 tially as set forth.

2. In a phonographic reproducing device,
 the combination with a suitable diaphragm
 55 and its supporting-frame, of a stylus, a spider

connecting the stylus with the center of the
 diaphragm and an auxiliary spider also con-
 nected to the stylus and to the diaphragm at
 points of concordant interfering vibration at
 a distance from the center of the diaphragm,
 60 and devices on the diaphragm intermediate
 the points of discordant vibration to dampen
 the latter, substantially as set forth.

3. In a phonographic reproducing device,
 the combination with a suitable diaphragm, 65
 its supporting-frame and casing, of a beveled
 ring *i* between the diaphragm and casing to
 stretch said diaphragm, a stylus connected to
 the diaphragm at the point of maximum vi-
 bration, auxiliary connections between the 70
 stylus and diaphragm at points of vibration
 in phase, and tapered strips of a suitable ma-
 terial secured to the diaphragm extending
 from the outer part toward the center at
 points of vibration out of phase with the 75
 others, substantially as set forth.

4. In a phonograph, the combination with
 a diaphragm, of a stylus connected to the dia-
 phragm at points of harmonic vibration and
 means to destroy or dampen those portions of 80
 the diaphragm vibrating out of harmony with
 the fundamental, substantially as set forth.

5. In a phonograph, the combination with
 a diaphragm, of a stylus connected to the dia-
 phragm to reproduce the fundamental and at 85
 other harmonic points, and means to dampen
 or destroy those vibrations out of harmony,
 substantially as set forth.

6. In a phonograph, the combination with
 a diaphragm, of a stylus connected to the dia- 90
 phragm at its point of maximum vibration
 and at other points producing concordant in-
 terfering sounds, and dampers secured to the
 diaphragm at points of discordant interfer-
 ing vibrations, substantially as set forth. 95

7. In a phonograph, the combination with
 a diaphragm, of a stylus connected to the dia-
 phragm at its point of maximum vibration
 and at other points producing concordant in-
 100 terfering sounds, and strips of paper secured
 to the diaphragm at points of discordant in-
 terfering vibration, substantially as set forth.

In testimony whereof I have signed my
 name to this specification in the presence of
 two subscribing witnesses.

VIRGILIO LOPEZ GARCIA.

Witnesses:

PEDRO ALBERTO BREUER,
 ANTO. L. BELLO.

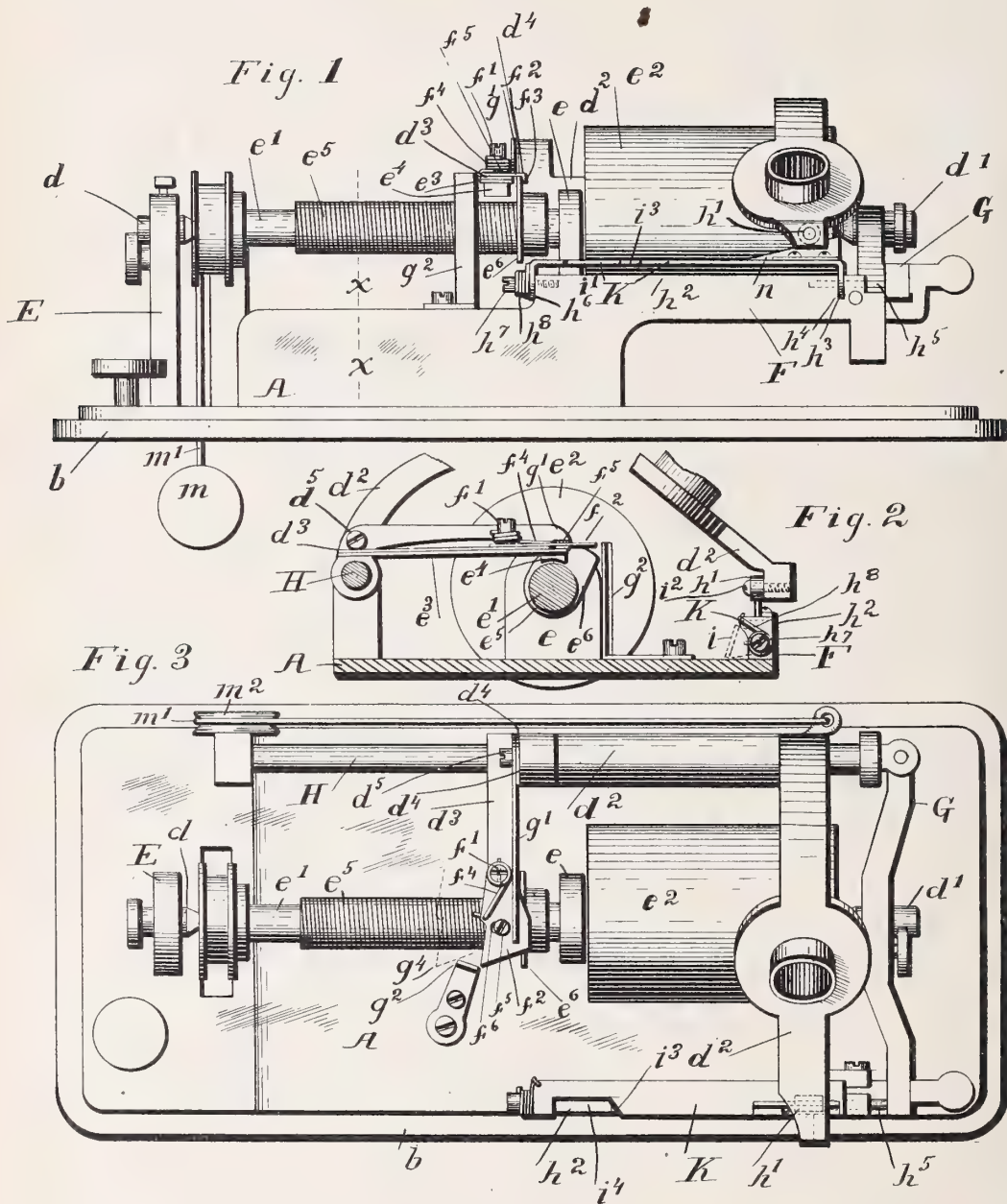
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No. 721,363.

PATENTED FEB. 24, 1903.

E. GILMAN.
REPEATING ACTION FOR PHONOGRAPHS.
APPLICATION FILED MAY 17, 1902.

NO MODEL.



WITNESSES:

Linus Barnes
Ollis Barnes

INVENTOR

Edward Gilman
BY
George L. Barnes
ATTORNEY.

UNITED STATES PATENT OFFICE.

EDWARD GILMAN, OF NEW HAVEN, CONNECTICUT.

REPEATING-ACTION FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 721,363, dated February 24, 1903.

Application filed May 17, 1902. Serial No. 107,711. (No model.)

To all whom it may concern:

Be it known that I, EDWARD GILMAN, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Repeating-Actions for Phonographs, of which the following is a full, clear, and exact specification.

My invention relates to an automatic return-carrier and repeating-action for phonographs and analogous devices.

It has for its object to provide mechanism for automatically returning the reproducer to the commencement of the record at the end of its travel, and thus repeating the action of the speaker.

The invention consists in the novel arrangement and combination of a cam upon the driving-shaft for disengaging the sectional operating-nut from the driving-screw, an automatically-projected part upon the reproducer-carriage for intercepting the cam to disengage the nut, and a return track or guide for holding the nut clear of the driving-screw and the speaker clear of the record on the return movement of the reproducer, and in the construction of parts, as hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a side elevation of a phonograph fitted with my automatic return-carrier and repeating mechanism, showing the operating-nut disengaged from the driving-screw at the end of its travel preparatory to its return. Fig. 2 is a vertical cross-section on the line xx of Fig. 1. Fig. 3 is a plan view of Fig. 1.

Referring to the drawings, A designates the base-plate of an ordinary phonograph, which is mounted upon the top of the case B and provided with the fixed standard E, having the center d and the frame F, to which is hinged the gate G, having the center d' , which centers, in connection with the intermediate bearing e , support the driving-shaft e' , whereon the record e^2 is mounted.

H designates the guide-rod, upon which the reproducer-frame d^2 travels, and to the frame is attached the usual arm e^3 , carrying the section of a nut e^4 , adapted to engage and be driven by the screw-threaded portion e^5 of the driving-shaft. These elements are all old

and well-known and here require no further description, the improvement comprising my invention being as follows:

Upon the driving-shaft e' , at the end of the feed-screw adjacent the bearing e , is secured a cam e^6 , adapted to revolve with the shaft and the record e^2 . Above and resting upon the arm e^3 is a similar arm d^3 , having an ear d^4 , by which it is fastened to the frame d^2 by the screw d^5 , inserted therein through said ear. Pivoted to this arm vertically over the shaft by means of a screw f' is a slide f^2 , having a depending flange f^3 on the edge toward the record. A spring f^4 , wound around the screw f' , with one end secured through the screw and the other through the slide, normally tends to thrust the slide in the direction toward the record and hold it with its flanged edge projecting somewhat beyond the corresponding edge of the arm d^3 , as shown in the figures. This flanged edge is adapted to be engaged by the cam e^6 to lift the arm e^3 and disengage the sectional nut e^4 from the thread of the driving-shaft, as shown in the figures. A supporting-arm g' , also secured to the frame d^2 by the screw d^5 , bears at its outer end upon the slide f^2 , and with the screw f^5 , secured in the plate d^3 through the slot f^6 in the slide, receives the strain upon the slide of the cam e^6 .

Mounted upon the base-plate A is a vertical post g^2 , set in such position that it will intercept the pointed end of the slide f^2 just before the latter in its travel reaches the point at which it is to be engaged by the cam e^6 , as indicated by the dotted line g^4 in Fig. 3. The result of such engagement of the slide will be to arrest its motion and cause it to be swung backward from the normal position on its pivot f' against the tension of its spring f^4 , as the reproducer-frame and the arm e^3 and nut e^4 are meanwhile impelled forward by the driving-screw. The adjustment and proportions of the post and slide are such that the slide in thus swinging backward will soon clear the bar and will then be sprung forward by action of the spring f^4 to normal position, which at that point brings it into the revolving path of the cam e^6 . In this position it will be struck by the cam and lifted to sufficient height to disengage the sectional nut e^4 from the screw-thread e^5 .

The free end of the reproducer-frame d^2 is provided with the usual friction-roll h' , which in this construction, as in ordinary phonographs, is adapted to track along the horizontal guiding edge h^2 of the base-plate as the reproducer is advanced by the driving-screw; but in connection with my improvements the roll on the return movement of the reproducer is adapted to track upon a suitable removable track or guide K, comprising a flat bar having its ends bent over to the vertical position to form ears, which are hinged to the edge h^2 , as shown, the ear h^3 , near the gate G, being let into a suitable slot h^4 in said edge and pivoted thereto by a pin h^5 , inserted lengthwise in the said edge through the ear, and the ear h^6 being pivoted at the opposite end of the edge h^2 by a screw h^7 . Said screw, like the screw f^1 , is provided with an extended head, around which is coiled a spring h^8 , secured at one end through the head and fastened at the other end to the inner edge of the guide K. The spring normally tends to throw and hold the guide up over the edge h^2 in the position to form a track for the roll h' during the return movement of the recorder, as shown in the figures; but the said track when thrown over inwardly, turning on its axial center, will occupy the position designated by the dotted lines i in Fig. 2, entirely out of the way of the roll, which will in such case travel upon the regular guiding-track formed by the edge h^2 of the base-plate. The guide K therefore requires to be in the elevated position during the return or non-operative stroke of the reproducer-frame and removed from such position during the feeding or operative stroke. This result is accomplished by means of the following construction: At the end adjacent the ear h^6 a notch or opening i' is provided in the guide K in the track of the roll h' , suitable to allow the roll to drop through it to the guiding edge h^2 on the return stroke of the reproducer-frame. As the roll drops through the notch the rounded head i^2 of the screw forming the pivot of the roll will impinge against the guide and crowd it over inwardly to a position from which its continued depression is easily effected by the engagement of the roll with the beveled edge i^3 of the notch in the return movement of the carriage to the position shown by the dotted lines i in Fig. 2. The resistance of the spring h^8 to the inward movement of the guiding-track serves to cushion the descent of the reproducer-frame d^2 and prevents the speaker from striking with shock upon the record.

The operation of the machine is as follows: Assuming the guide K to be in the depressed position, with the reproducer-frame feeding along by engagement of the sectional nut with the driving-screw, this movement will be continued until the engagement of the slide f^2 with the post g^2 and its subsequent release and engagement by the cam e^6 lifts the nut out of contact with the screw and raises the roll h' from the guiding edge h^2 . This permits

the track K to spring up to the elevated position, whereby the reproducer-frame is prevented from dropping back to its former position. The return of the carriage may be effected by a spring or gravity, as preferred, a weight m being employed in the present instance, attached to the reproducer-frame by a line m' passing over a pulley m^2 , mounted on the base-plate; but in order to assist in overcoming the inertia of the carriage, and thereby avoid undue increase of the weight m , it is preferable to arrange an inclined plane n on the track, whereon the roll h' may track at the inception of its return movement, by which means the weight of the reproducing-frame will materially aid in starting it backward. The inclined plane may be made adjustable on the track, if preferred. On the return of the frame the roll after leaving the incline will run on the track K till it reaches the notch i' , when it will drop through the same, as hereinafter described, thus reengaging the nut and driving-screw, and the operation will be repeated indefinitely. The depending flange f^3 of the slide f^2 prevents the premature return of the reproducer-frame and insures the slide being retained in contact with the cam until elevated to its highest position.

I claim and desire to secure by Letters Patent—

1. In an automatic return and repeating-action for phonographs the combination with the record-revolving and reproducer-feeding mechanism of means for disengaging the feeding mechanism, and a return-carrier actuated to spring beneath and support the track-bearing of the reproducer-frame on its return stroke, substantially in the manner and for the purpose specified.

2. In an automatic return and repeating-action for phonographs the combination with the record-revolving and reproducer-feeding mechanism of a revolving cam carried by the driving-shaft, a slide mounted upon the reproducer-frame, means for automatically projecting the slide into the path of the cam, and a return-carrier actuated to spring beneath and support the bearing of the reproducer-frame on its return stroke, substantially in the manner and for the purpose specified.

3. In an automatic return and repeating-action for phonographs the combination with the record-revolving and reproducer-feeding mechanism, of a revolving cam carried by the driving-shaft, a spring-pushed slide carried by the reproducer-frame, a stationary stop for retracting the slide by the advance of the reproducer-frame and subsequently liberating it into the path of the cam, and a track for supporting the reproducer-frame on its return movement, substantially in the manner and for the purpose specified.

4. In an automatic return and repeating-action for phonographs the combination with the record-revolving and reproducer-feeding mechanism, of a revolving cam carried by the

driving-shaft, a spring-pushed slide carried by the reproducer-frame, a stationary stop for retracting the slide by the advance of the reproducer-frame, and subsequently liberating it into the path of the cam, a track for supporting the reproducer-frame on its return movement, means for springing the track beneath the bearing of the reproducer-frame as the frame is elevated at the end of its feeding movement, and means for removing the track from the path of the reproducer-bearing by the initial advance of the reproducer-frame in feeding, substantially in the manner and for the purpose specified.

5 5. In a phonograph or analogous mechanism, the combination of the record feed-screw, a cam revolving therewith, the traveling reproducer-frame, an arm carried thereon, a sectional nut carried on said arm engageable with the feed-screw by elevation of the frame, a slide pivoted to said arm, a spring for pressing the slide in the direction of the feeding movement, a stationary stop for intercepting the slide in such advance movement near the end of its travel but permitting its release after a further advance of the frame, whereby the slide is projected into the path of the cam to disengage the feed nut and screw, a track for guiding the reproducer-frame on its return travel, and means for actuating the

frame on said return motion substantially in the manner and for the purpose specified.

6. In a phonograph or analogous mechanism, the combination of the record feed-screw, a cam revolving therewith, the traveling reproducer-frame, an arm carried thereon, a sectional nut carried on said arm engageable with the feed-screw by elevation of the frame, a flanged slide pivoted to said arm, a spring for pressing the slide in the direction of the feeding movement, a stationary stop for intercepting the slide in such advance movement near the end of its travel but permitting its release after a further advance of the frame, whereby the slide is projected into the path of the cam to disengage the feed nut and screw, a track for guiding the reproducer-frame on its return travel, provided with an initial incline for starting the frame by its own gravity, and means for impelling the frame through said return stroke, substantially in the manner and for the purpose specified.

Signed by me at New Haven, Connecticut, this 14th day of May, 1902.

EDWARD GILMAN.

Witnesses:

HELEN C. WHEAT,
GEORGE L. BARNES.

No. 722,616.

PATENTED MAR. 10, 1903.

D. PETRI-PALMEDO.
REPEATING ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED JUNE 19, 1902.

NO MODEL.

Fig. 1.

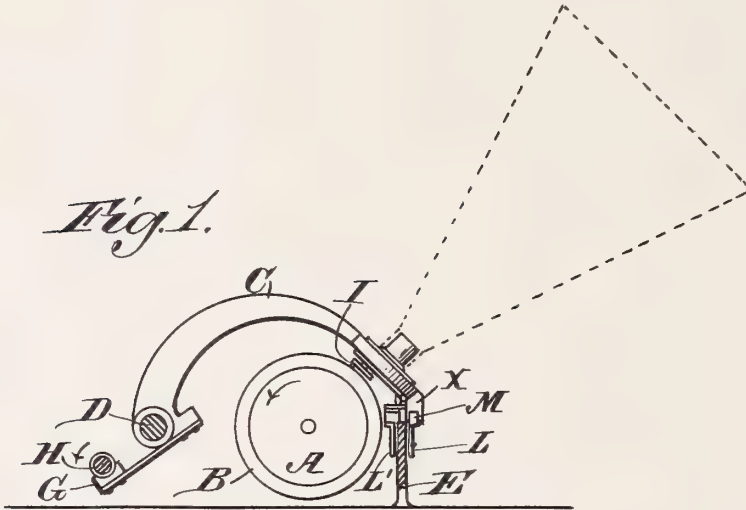
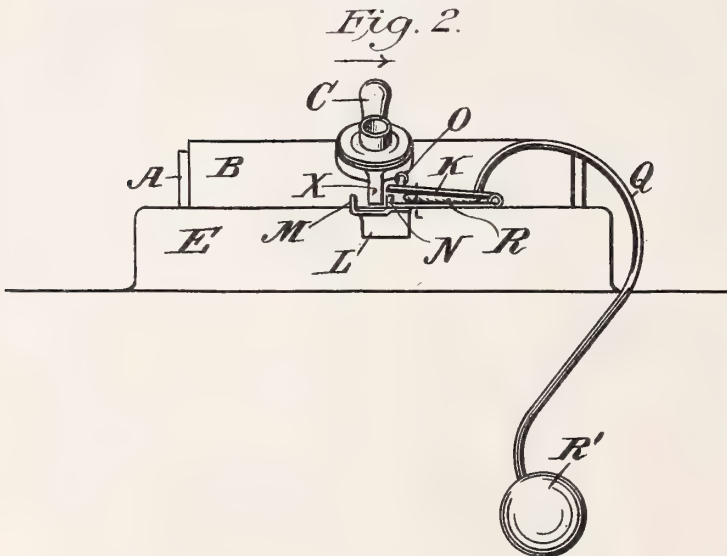


Fig. 2.



Witnesses,
Robert Everett,
J. B. Keeler

Inventor,
David Petri-Palmedo.
By *James L. Norris,*
Att'y.

UNITED STATES PATENT OFFICE.

DAVID PETRI-PALMEDO, OF SCRANTON, PENNSYLVANIA, ASSIGNOR TO
INTERNATIONAL TEXT BOOK COMPANY, OF SCRANTON, PENNSYLVANIA,
A CORPORATION OF PENNSYLVANIA.

REPEATING ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 722,616, dated March 10, 1903.

Application filed June 19, 1902. Serial No. 112,350. (No model.)

To all whom it may concern:

Be it known that I, DAVID PETRI-PALMEDO, a citizen of the United States, residing at Scranton, in the county of Lackawanna and State of Pennsylvania, have invented new and useful Improvements in Repeating Attachments for Phonographs, of which the following is a specification.

This invention relates to an attachment for sound recording and reproducing machines; and the object of the invention is to provide simple mechanism for easily and conveniently repeating portions, such as single words or short sentences or a single bar or fugue of a recorded speech or a piece of music, respectively.

The invention in one simple and convenient embodiment thereof is shown in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a side elevation of certain of the parts of an Edison phonograph embodying my improvements. Fig. 2 is a front elevation of the same.

Like characters refer to like parts in both figures of the drawings.

I have shown in the drawings a simple organization of parts for the purpose of representing the character of the invention, and by the same in order to repeat any part of a record upon the cylinder of the instrument the feed-screw mechanism must be temporarily disengaged, the speaker or reproducing-diaphragm must be lifted from the record, and the reproducing-stylus set back a certain distance. The reproducing-point must be brought in contact with the record again and the feed mechanism put in coöperative relation therewith. These functions I accomplish by a single motion of the hand, as will be clear from the following description of my attachment.

In the drawings, A represents the mandrel of an Edison phonograph; B, the wax cylinder upon which sound is recorded.

C is the so-called "speaker-arm," that carries the speaker, with its diaphragm and reproducing-point I. This speaker-arm is guided at one end on a rod D, and at the other end it

rests on a ledge E, but a small antifriction-roller enables the speaker-arm to freely slide back and forth on its guide. Besides this lateral motion the speaker-arm can be lifted from the ledge E, turning about its guiding-rod D. When resting on the ledge E, as shown in the drawings, a feed-nut G, attached to the rear end of the speaker-arm, engages a feed-screw H, which being actuated by a spring-motor causes the speaker-arm to travel laterally across the record; but when the speaker-arm is lifted from the ledge E the feed-screw and feed-nut G and H are disengaged, allowing the speaker-arm to be shifted back and forth on the guide-rod D independently of the feed mechanism.

All of the foregoing description pertains to the well-known apparatus of the Edison phonograph, and my improvements are shown incorporated therein.

For repeating single words, short sentences, &c., I provide a hinge K, having wings or pieces L and L', by means of which it rides on the ledge E of the phonograph. Two projections M and N are provided to the lower part of the hinge. Between these stops fits the projecting lug X of the speaker-arm with a clearance. On the upper half of the hinge is provided a small antifriction-roller O, that rests against the circular portion of the speaker-arm, containing the reproducing-diaphragm, or the so-called "speaker-ring." Between the two halves of hinge K, I place a small elastic rubber bag R, which is connected by a rubber tube Q with an elastic bulb R'. On pressing the bulb R' the rubber bag is inflated, the upper part of the hinge is lifted up, and in turn lifts the speaker-arm from the ledge E. Next by its own weight the speaker-arm slides down upon the antifriction-roller O and to the left against the stop M. On releasing the pressure on the bulb R' the feed mechanism is again engaged, and the speaker-arm is again caused to advance by virtue of the feed mechanism. The lug is caused to travel from the projection M toward the projection L, then takes the whole hinge along with it, and at any time that a repetition of a word or sentence, &c., is de-

sired the speaker-arm can be set back a small distance by pressing on the bulb R' in the manner thus described, thus causing the diaphragm to repeat. The wings L and L' frictionally hug or straddle the ledge or rail E of the frame to a degree sufficient that when the attachment is at rest and the sound-reproducing device is moved backward in the manner indicated the projection M when engaged by the lug X will resist or stop further backward motion of said sound-reproducing device.

The invention is not limited to the construction hereinbefore set forth, the same being shown and described simply for the purpose of indicating the nature of my improvement, for many variations in the form and arrangement of parts may be made within the scope of the accompanying claims. It will be also understood that the attachment is not limited in its application to any particular kind of sound recording and reproducing instrument.

Having described the invention, what I claim is—

1. The combination of a sound-record, a sound-reproducing device coöperative therewith, feed mechanism for advancing the sound-reproducing device, a member movable with the sound-reproducing device and having a projection, mechanism for throwing the sound-reproducing device out of coöperative relation with its feed mechanism, and causing the retraction of the same until it abuts against said projection.

2. The combination of a sound-record, a sound-reproducing device coöperative therewith, feed mechanism for advancing the sound-reproducing device, a member movable with the sound-reproducing device and having a pair of projections, a lug upon the sound-reproducing device disposed between said projections, and mechanism for throwing the sound-reproducing device out of coöperative relation with its feed mechanism, and causing the retraction of the same until it abuts against one of said projections.

3. The combination of a sound-record, a sound-reproducing device coöperative therewith, feed mechanism for advancing the sound-reproducing device, a hinge coöperative with the sound-reproducing device and one of the parts of the hinge carrying an antifriction-roll adapted to engage an inclined surface upon the sound-reproducing device, and the other part of the hinge having a pair of projections, a lug upon the sound-reproducing device disposed between the said projections, and means for operating that part of the hinge which carries said antifriction-roll, relative to the companion member of said hinge.

4. The combination of a sound-record, a sound-reproducing device coöperative therewith, feed mechanism for advancing the sound-reproducing device, a hinge coöperative with the sound-reproducing device, and

one of the parts of the hinge carrying an antifriction-roller adapted to engage an inclined surface upon the sound-reproducing device and the other part of the hinge having a pair of projections, a lug upon the sound-reproducing device disposed between the said projections, an inflatable bag between the members of said hinge, and a tube connected with said inflatable bag, and provided with a bulb.

5. The combination of a sound-record, a sound-reproducing device coöperative therewith, feed mechanism for advancing the sound-reproducing device, a member movable with the sound-reproducing device and having a projection, mechanism for throwing the sound-reproducing device out of coöperative relation with its feed mechanism, and causing the retraction of the same until it abuts against said projection, and including a single manually-controlled device for securing the operation specified.

6. The combination of a sound-record, a sound-reproducing device having a rounded surface, feed mechanism for advancing the sound-reproducing device, a movable member having a projection to engage said rounded surface, means for actuating said movable member to cause the same to throw the sound-reproducing device out of operative relation with its feed mechanism and to also cause the retraction of said sound-reproducing device, and a projection adapted to be engaged by the sound-reproducing device on its retractive movement.

7. The combination of a sound-record, a sound-reproducing device, feed mechanism for advancing the sound-reproducing device, a member having two projections between which a part of the sound-reproducing device is normally located whereby said part can engage the foremost projection to carry the said member forward on the advance of the sound-reproducing device, and means for throwing the sound-reproducing device out of coöperative relation with its feed mechanism, and causing the retraction of the same until it abuts against the rearmost projection.

8. The combination of a sound-record, a sound-reproducing device, feed mechanism for advancing the sound-reproducing device, a member having two projections between which a part of the sound-reproducing device is normally located whereby said part can engage the foremost projection to carry the said member forward on the advance of the sound-reproducing device, and means carried by said member for throwing said sound-reproducing device out of coöperative relation with its feed mechanism, and causing the retraction of the same until it abuts against the rearmost projection.

9. The combination of a sound-record, a sound-reproducing device, feed mechanism for advancing the sound-reproducing device, and a hinge one member of which is provided with projections between which a part of the sound-reproducing device is disposed where-

by such part by engaging the foremost projection is adapted to advance the hinge therewith and the other member of the hinge being adapted to throw the sound-reproducing device out of operative relation with the feed mechanism, and to also cause the retraction of the same until it engages the rearmost projection.

10. A repeating attachment for phonographs adapted to travel with but not attached to the sound-reproducing device thereof upon the phonograph-frame, and including two projections adapted to be alternately engaged by a part of the latter to thereby feed the attachment back and forth therewith.

11. A repeating attachment for phonographs adapted to travel with but not attached to the sound-reproducing device thereof upon the phonograph-frame, and including two projections adapted to be alternately engaged by a part of the latter to thereby feed the attachment back and forth therewith, and having means for actuating the sound-reproducing device to put it out of coöperative relation with its feed mechanism, and for also causing the retraction of the same.

12. A repeating attachment for phonographs adapted to be removably connected therewith, and having means to be actuated by said sound-reproducing device to move said attachment when moved forwardly, and

to also stop said sound-reproducing device when the same is moved rearwardly.

13. A repeating attachment for phonographs adapted to be removably connected therewith, and having means to be actuated by said sound-reproducing device to move said attachment when moved forwardly, and to also stop said sound-reproducing device when the same is moved rearwardly, and also having means for actuating the sound-reproducing device to put it out of coöperative relation with its feed mechanism, and to effect the retraction of the said sound-reproducing device.

14. A repeating attachment for phonographs adapted to be removably connected therewith and including two projections adapted to be alternately engaged by a part of the sound-reproducing device whereby the attachment will be fed back and forth therewith, and having a shiftable member provided with a projection for engaging the sound-reproducing device to lift the same and also effect its retraction.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DAVID PETRI-PALMEDO.

Witnesses:

MAX HIRSCHFELDER,
DAVID COTTE.

M. Edwards - Rs 12, 095

T. H. MACDONALD.
PROCESS OF MAKING SOUND RECORDS.
APPLICATION FILED JAN. 22, 1903.

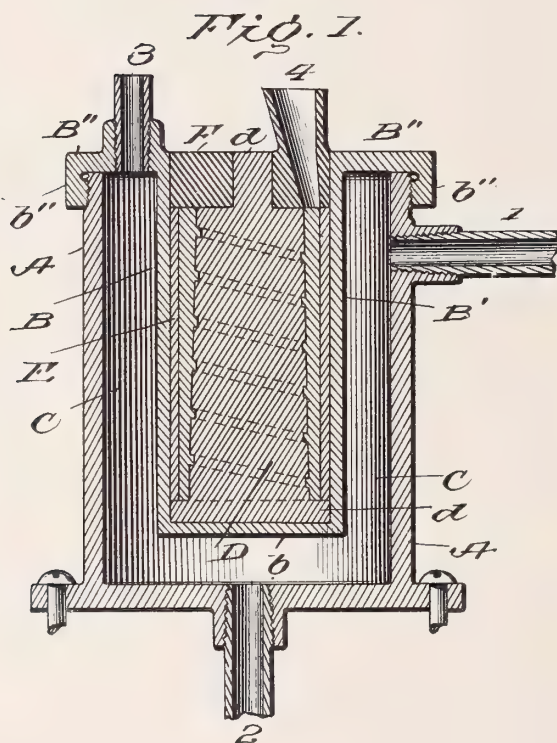
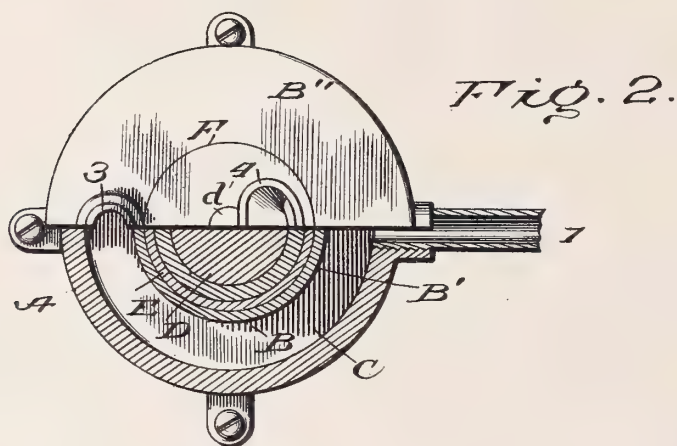


Fig. 3.



Inventor

Thomas H. Macdonald

By

Max Cameron & Co. Attorneys

Witnesses

Wm. B. Kerhane

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
THE AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT
OF COLUMBIA.

PROCESS OF MAKING SOUND-RECORDS.

SPECIFICATION forming part of Reissued Letters Patent No. 12,095, dated March 10, 1903.

Original No. 682,991, dated September 17, 1901. Application for reissue filed January 22, 1903. Serial No. 0,123.

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in Processes of Making Sound-Records, which invention is fully set forth in the following specification.

This invention relates to improvements in sound-records and in the method of producing them by molding; and it consists in first superheating the material while in the mold and in then suddenly applying cold, whereby I obtain better results than heretofore possible.

The invention consists, further, in certain details to be hereinafter pointed out.

In order to explain my invention more readily, I refer to the annexed drawings, which show one form of apparatus for carrying out my process.

Figure 1 is a vertical sectional view; and Fig. 2 is a plan, partly broken away. Fig. 3 is intended to illustrate the improved sound-record.

The record is cast into a suitable mold, which is surrounded by a steam and water jacket for superheating and cooling the casting. This jacket consists of an outer shell A and an inner shell B for the mold, these shells inclosing between them the steam-tight space C. Shell A is closed at the bottom and open at the top for receiving shell B and is provided with valve-controlled inlets 1 and 2 for steam and cold water, respectively. Shell B consists of a hollow cylinder B', also closed at the bottom *b* and open at the top, and has an annular flange B'', that rests upon the top of shell A and is secured thereto, as by screw-threaded lip *b''*. Flange B'' constitutes the cover of the inclosed space C and serves to suspend shell B therein and is provided with the valve-controlled outlet 3. Core D has the base *d* fitting snugly in shell B' and resting on bottom *b*, and at its upper end carries the stem *d'*. A suitable matrix E is fitted snugly into shell B to rest upon base *d*. A head F is inserted in the top of shell B and rests squarely upon the top of matrix E and core D, stems *d'* taking into a suitable opening in the head, which thus assists in secur-

ing the core in proper position. The annular space between the matrix and the core (constituting the mold) is thus inclosed by the base *d* and the head F. The head is provided with the funnel 4, forming an inlet for pouring into the mold the melted material that is to form the improved sound-record.

In carrying out my invention I proceed as follows: I fill the mold (through funnel 4) with the melted material, (soap mixture or the like,) which is hereinafter for convenience designated "wax," though I do not limit myself to a wax-like composition, since any suitable material or composition that can be readily handled may be employed and will come within the scope of my invention. I then admit steam through inlet 1 into the space C and heat the mold and its contents up to, say, about 350° Fahrenheit and maintain the heat for some time, preferably until the entire mass of the wax is in a limpid state. This superheating forces out all air-bubbles from the mass of the wax and from the minute spaces in and around the irregularities in the matrix-surface, thus producing a more intimate relation between the molten wax and the matrix. After maintaining this heat for a length of time sufficient to drive off all bubbles and impurities I then admit cold water through inlet 2 and allow the steam to escape through outlet 3. This sudden application of cold chills the surface of the wax instantly and symmetrically and causes it to contract from the matrix-surface sufficiently to clear the now solidified casting from the matrix and permit its withdrawal. The fact that the cold acts evenly from all sides causes the contracting to be even and regular, so that cracking, &c., are avoided. Moreover, owing to the abnormal compression or concentration of the molten mass during the period of superheating and also to the subsequent enormous force of contraction due to the sudden chilling of its surface the sound-record molded by my process is much denser and harder on the surface than in case of an ordinary record made in the usual manner. It is, so to speak, "case-hardened" or tempered. Further, inasmuch as this symmetrical chilling effect takes place from the

exterior of the mold and its casting I have discovered that with the composition at present employed (which is a mixture of two ingredients, as stearic acid and ceresin, both
5 the hardness and the melting-point or solidifying-point of one ingredient being higher than those of the other) the first effect of this sudden exterior chilling is an initial reduction of the temperature to a point below the
10 solidifying-point of the harder ingredient, which is thereupon converted into a thin shell or film, while the softer ingredient (still remaining liquid) is consequently forced inward. The result is as already indicated,
15 viz: a casting whose exterior surface is much harder and denser than its mass, though the gradation is so gradual and imperceptible that there is no line of separation that might cause the outer casing to break off or the inner to shrink away.

Instead of admitting steam after the wax has been poured into the mold it may be admitted simultaneously or beforehand, as the object to be accomplished is the superheating of the molten mass and the maintaining
25 of that heat. It is obvious that other means may be employed for superheating the material while in the mold.

Among the superior advantages of my case-hardened record so produced are that the mass being denser is less liable to be affected by changes of temperature and moisture and that being harder it is not so readily worn out by the action of a reproducing-stylus. Besides, while it would be difficult to engrave a
30 satisfactory original sound-record upon a surface as hard as that produced by my process, yet by this process a sound-record equally as good as an original record is readily and
40 cheaply produced in a more durable condition.

Of course I do not limit myself either to a cylindrical sound-record or to one of the type characterized by vertical irregularities, since
45 the spirit of my invention consists in maintaining the molten wax (while in connection with its matrix) in a superheated condition and in then suddenly and symmetrically chilling it.

The record produced by the process herein described gives improved results in reproduction and is more durable than records made by direct engraving. In the latter the surface over which the reproducer-point rubs in
55 reproducing is made by a cutting or scraping instrument having a blunt edge. When this

surface is examined under a magnifying-glass, it is seen to be roughly broken, the molecules of wax having been disturbed and their adhesion to one another weakened. The reproducing-stylus rubbing over such a surface
60 detaches these projecting particles, further roughening the surface and causing scratching sounds in the reproduction. On the other hand, the surface of the molded record being
65 formed by the cooling of melted particles strongly adherent one to another offers far greater resistance to roughening by the reproducer. Such records therefore have longer
70 life than those made in the ordinary way.

The improved sound-record resulting from the process herein described is claimed in a divisional application filed May 21, 1901, Serial No. 61,267.

Having thus described my invention, I
75 claim—

1. The process of molding sound-records which consists in filling a suitable matrix with a suitable composition, maintaining the same
80 for a length of time in a superheated condition, and then suddenly and symmetrically chilling it, substantially as described.

2. The process of making a sound-record, which consists in pouring a suitable melted material into a suitable matrix-mold, then
85 admitting steam into a jacket surrounding said matrix and continuing this step until the said material has become limpid and impurities are driven off and the said material forced into intimate contact with its matrix,
90 then allowing the steam to escape and admitting cold water into the jacket whereby the said material is suddenly and symmetrically chilled from its exterior surface next its matrix, substantially as and for the purpose set
95 forth.

3. The process of molding sound-records which consists in filling a suitable matrix with a suitable material and maintaining the same
100 for a length of time in a superheated condition, and then suddenly and symmetrically chilling the same from the exterior inward, substantially as and for the purpose described.

In testimony whereof I have signed my
105 name to this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

M. A. FOGO,
A. B. KEOUGH.

T. H. MACDONALD.

SOUND RECORD.

APPLICATION FILED JAN. 22, 1903.

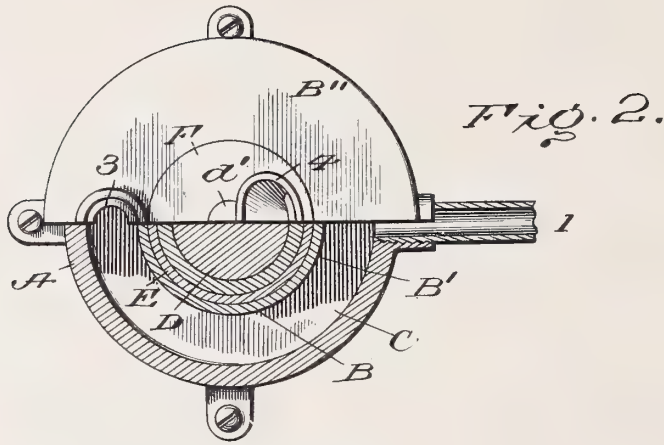


FIG. 1.

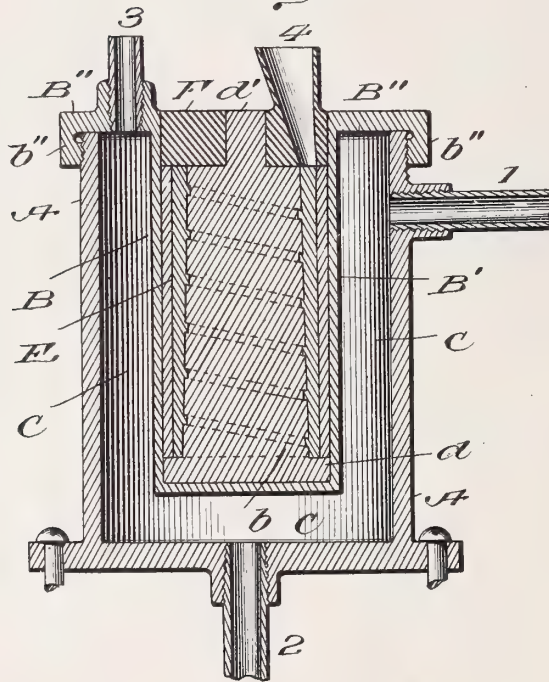


FIG. 3.



Witnesses

John M. M. M. M. M.
Wm. B. Herkum

Inventor

Thomas H. Macdonald

By *Mauro, Cammaro & Jones*
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
THE AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT
OF COLUMBIA.

SOUND-RECORD.

SPECIFICATION forming part of Reissued Letters Patent No. 12,096, dated March 10, 1903.

Original application filed November 3, 1900, Serial No. 35,351. Divided and application filed May 21, 1901, Serial No. 61,267.
Patented September 17, 1901, No. 682,992. Application for reissue filed January 22, 1903. Serial No. 140,124

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in
5 Sound-Records, which invention is fully set forth in the following specification.

This invention relates to an improvement in sound-records; and it consists in the improved record itself, this application being a
10 division of my application, filed November 3, 1900, Serial No. 35,351.

In order to explain my invention more readily, I refer to the annexed drawings, which show one form of apparatus for carrying out
15 my process.

Figure 1 is a vertical sectional view, and Fig. 2 a plan partly broken away. Fig. 3 is intended to illustrate the improved sound-record.

20 The record is cast into a suitable mold which is surrounded by a steam and water jacket for superheating and cooling the casting. This jacket consists of an outer shell A and an inner shell B for the mold, these shells
25 inclosing between them the steam-tight space C. Shell A is closed at the bottom and open at the top for receiving shell B and is provided with valve-controlled inlets 1 and 2 for steam and cold water, respectively. Shell B
30 consists of a hollow cylinder B', also closed at the bottom *b* and open at the top and has an annular flange B'', that rests upon the top of shell A and is secured thereto, as by screw-threaded lip *b''*. Flange B'' constitutes the
35 cover of the inclosed space C and serves to suspend shell B therein and is provided with the valve-controlled outlet 3. Core D has the base *d* fitting snugly in shell B' and resting on bottom *b* and at its upper end carries
40 the stem *d'*. A suitable matrix E is fitted snugly into shell B to rest upon base *d*. A head F is inserted in the top of shell B and rests squarely upon the top of matrix E and core D, stems *d'* taking into a suitable opening
45 in the head, which thus assists in securing the core in proper position. The annular space between the matrix and the core (constituting the mold) is thus inclosed by the base *d* and the head F. The head is provided

with the funnel 4, forming an inlet for pour- 50
ing into the mold the melted material that is to form the improved sound-record.

In carrying out my invention I proceed as follows: I fill the mold (through funnel 4) with the melted material, (soap mixture or
55 the like,) which is hereinafter for convenience designated "wax," though I do not limit myself to a wax-like composition, since any suitable material or composition that can be readily handled may be employed and will
60 come within the scope of my invention. I then admit steam through inlet 1 into the space C and heat the mold and its contents up to, say, about 350° Fahrenheit and maintain the heat for some time, preferably until the entire
65 mass of the wax is in a limpid state. This superheating forces the melted wax into a more intimate relation with the matrix and expels all air-bubbles from the mass of the wax and from the minute spaces in and around
70 the irregularities in the matrix-surface, thus producing a more intimate contact between the molten wax and the matrix. After maintaining this heat for a length of time sufficient to drive off all bubbles and impurities I
75 then admit cold water through inlet 2 and allow the steam to escape through outlet 3. This sudden application of cold chills the surface of the wax instantly and symmetrically and causes it to contract from the
80 matrix-surface sufficiently to clear the now-solidified casting from the matrix and permit its withdrawal. The fact that the cold acts evenly from all sides causes the contracting to be even and regular, so that
85 cracking, &c., are avoided. Moreover, owing to the abnormal compression or concentration of the molten mass during the period of superheating and also to the subsequent enormous force of contraction due to the sudden
90 chilling of its surface the sound-record molded by my process is much denser and harder on the surface than in case of an ordinary record made in the usual manner. It is, so to speak, "case-hardened" or tem-
95 pered. Further, inasmuch as this symmetrical chilling effect takes place from the exterior of the mold and its casting I have dis-

covered that with the composition at present employed (which is a mixture of two ingredients, as stearic acid and ceresin, both the hardness and the melting-point or solidifying-point of one ingredient being higher than those of the other) the first effect of this sudden exterior chilling is an initial reduction of the temperature to a point below the solidifying-point of the harder ingredient, which is thereupon connected into a thin shell or film, while the softer ingredient (still remaining liquid) is consequently forced inward. The result is as already indicated—viz., a casting whose exterior surface is much harder and denser than its mass, though the gradation is so gradual and imperceptible that there is no line of separation that might cause the outer casing to break off or the inner to shrink away.

Instead of admitting steam after the wax has been poured into the mold it may be admitted simultaneously or beforehand, as the object to be accomplished is the superheating of the molten mass and the maintaining of that heat. It is obvious that other means for superheating the material may be employed.

Among the superior advantages of my case-hardened record so produced are that the mass being denser is less liable to be affected by changes of temperature and moisture and that being harder it is not so readily worn

out by the action of a reproducing-stylus. Besides, while it would be difficult to engrave a satisfactory original sound-record upon a surface as hard as that produced by my process, yet by this process a sound-record equally as good as an original record is readily and cheaply produced in a more durable condition.

Of course I do not limit myself either to a cylindrical sound-record or to one of the type characterized by vertical irregularities.

I claim—

1. A sound-record of suitable composition having the surface of the undulatory record case-hardened or tempered, substantially as described.

2. A sound-record of suitable material having its surface case-hardened or tempered and graduating inward into a comparatively softer mass by imperceptible degrees, substantially as described.

3. A molded sound-record of suitable composition having the surface of the undulatory record case-hardened or tempered.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

M. A. FOGO,

A. B. KEOUGH.

No. 722,776.

PATENTED MAR. 17, 1903.

W. TURES.
SOUND REPRODUCER.

APPLICATION FILED JUNE 13, 1902.

NO MODEL.

Fig. 1.

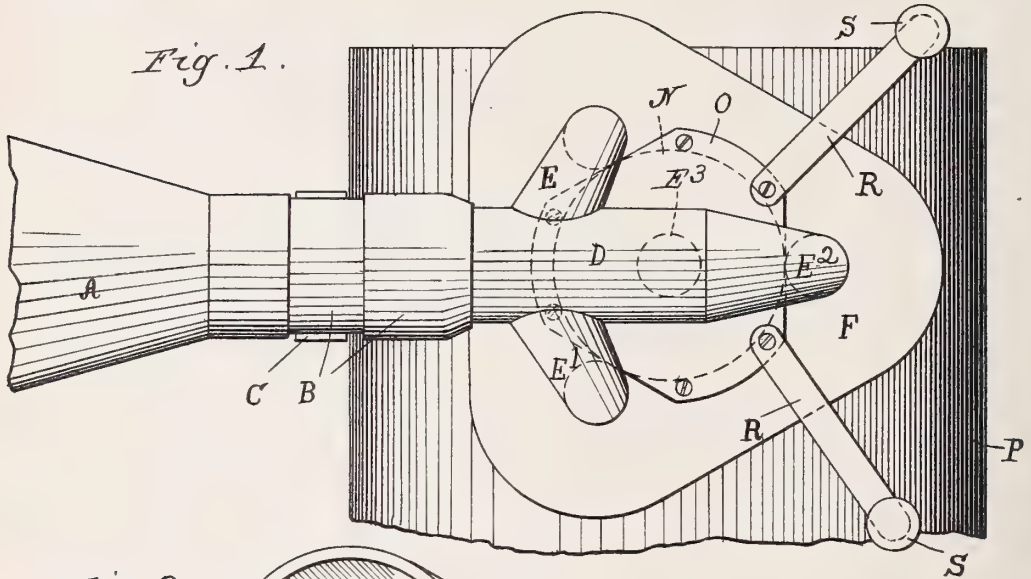


Fig. 2.

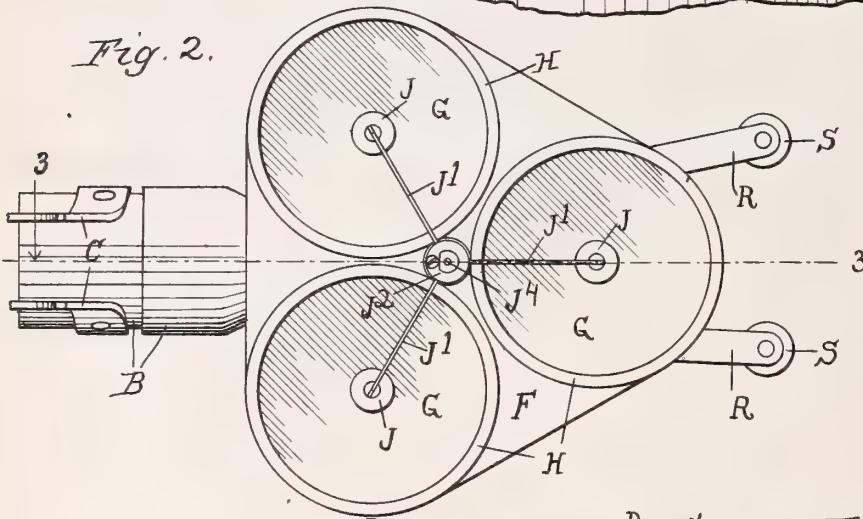
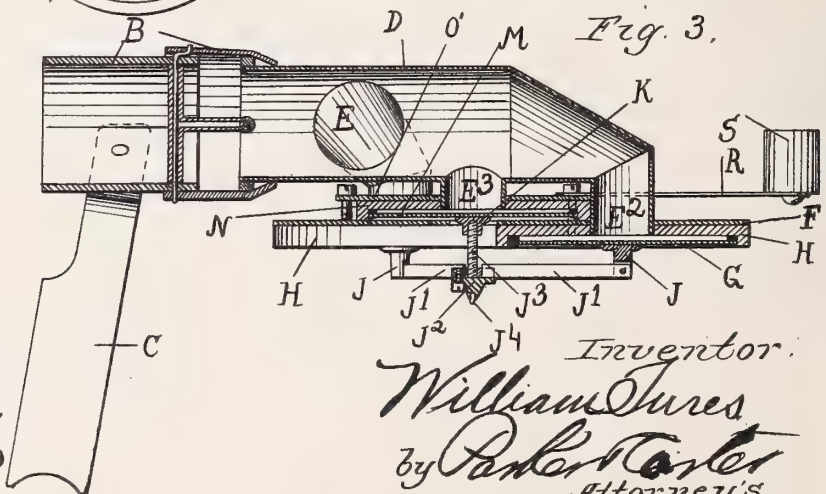


Fig. 3.



Witnesses.
E. J. Wray.
Weston Lazenby

Inventor:
William Tures
by Parker Porter
Attorney's.

UNITED STATES PATENT OFFICE.

WILLIAM TURES, OF GRANVILLE, ILLINOIS, ASSIGNOR OF ONE-HALF TO
EDGAR DUNHAM AND R. B. STRUTHERS, OF PRINCETON, ILLINOIS.

SOUND-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 722,776, dated March 17, 1903.

Application filed June 13, 1902. Serial No. 111,438. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM TURES, a citizen of the United States, residing at Granville, in the county of Putnam and State of Illinois, have invented a certain new and useful Improvement in Sound-Reproducers, of which the following is a specification.

My invention relates to sound-reproducers, such as are used in connection with talking-machines. The particular form which I have shown is of course only one of many types or shapes in which my device could be produced. I have shown this single form to illustrate my idea.

Figure 1 shows a plan view of the reproducer with a portion of the record beneath the same. Fig. 2 is an inverted plan view. Fig. 3 is a cross-section on line 3 3, Fig. 2.

Like parts are indicated by the same letter in all the figures.

A is the horn; B, the connecting-piece; C, the standard on which the reproducer is supported.

D is the common or trunk sound-transmitting way.

E, E', E², and E³ are branch sound-transmitting ways which open into the trunkway.

F is a plate on which the several parts are properly mounted.

G G G are diaphragms, each in a shallow cup-like part H, mounted on the plate F. To the center of each is secured the piece J, to which is pivoted the arm J', and this arm is attached to the tip J² on the post J³. To this tip is attached the bearing-point J⁴, which engages the record. The post J³ at its inner end is secured to a piece K, similar to the piece J, which is attached to the inner diaphragm M in the shallow cup-like part N, which is secured also to the plate F and to the plate O. The parts are attached together as indicated, so that they are brought in proper relation, so that each diaphragm is controlled by the action of the point J⁴ and through the medium of the several arms J', post J³, and pieces J J and K. The record is shown at P. Mounted on the body or plate F are the pivoted links R R, each preferably carrying at its outer extremity a weight S S. These links can be swung around on their

pivots, so as to adjust the weight in any desired manner.

The use and operation of my invention will be readily understood by those at all familiar with the art. I use a single point or pin, which may be of any desired shape or size and which travels in a groove on the record. It is arranged on a post mounted, preferably, on the center of a diaphragm, which is preferably mounted in a plane parallel to but different from the plane of the other diaphragms. There is then a series of diaphragms, preferably three, grouped about the post, and to each of these a preferably central attachment is made, from which leads an arm on the post. Thus all the diaphragms are controlled from a single point and in this particular construction from a single post. Each diaphragm is associated with a sound-transmitting way, and these several minor ways open into the common trunkway which leads to the horn.

The several parts may be greatly altered and varied in construction, proportion, position, and relation without departing from the spirit of my invention, and I do not, therefore, wish to be limited to the precise form and construction shown, but desire my illustration to be taken as diagrammatic.

I claim—

A sound-producer comprising a series of diaphragms arranged in close proximity to each other and in the same plane, with a single diaphragm arranged in close proximity thereto but in a different plane, all of said diaphragms parallel with each other, a central post mounted on said single diaphragm and proceeding up between the other diaphragms, laterally-projecting arms lying in a plane parallel to the diaphragms and attached to said post at one end and at the outer end each to a post on one of said group diaphragms and to a point associated with said central post, the system of arms and posts attached only to such diaphragms.

WILLIAM TURES.

Witnesses:

JOHN G. PLETSCH,
F. C. TAYLOR.

No. 722,977.

PATENTED MAR. 17, 1903.

G. H. HALL.

SOUND RECORDING AND REPRODUCING MACHINE.

APPLICATION FILED JAN. 7, 1902.

NO MODEL.

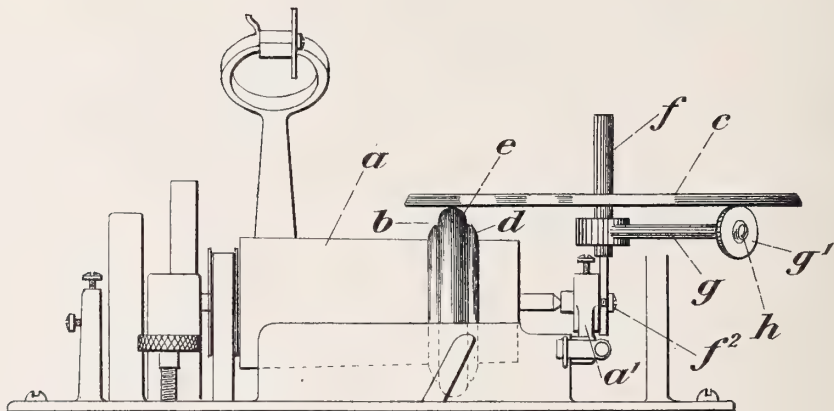


Fig. 1.

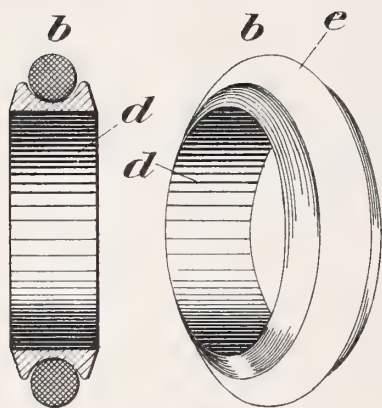


Fig. 2.

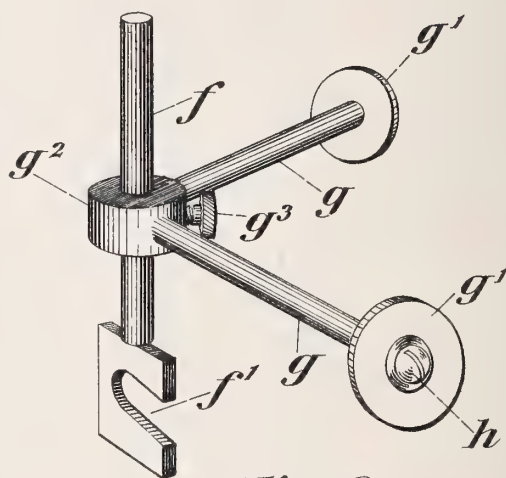


Fig. 3.

WITNESSES:

R. M. Kelly
John MacMaster

INVENTOR

Geo. H. Hall

BY

W. H. Hall
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE H. HALL, OF PHILADELPHIA, PENNSYLVANIA.

SOUND RECORDING AND REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 722,977, dated March 17, 1903.

Application filed January 7, 1902. Serial No. 88,735. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. HALL, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in
5 Sound Recording and Reproducing Machines, of which the following is a specification.

My invention relates to sound recording and reproducing machines; and it consists of the improvements and devices which are fully
10 set forth in the following specification and are shown in the accompanying drawings.

Owing to the distinctive character of phonographs and graphophones or those machines in which recording and reproduction
15 are effected by means of cylindrical sleeves carried on a rotating cylinder as compared with gramophones or those machines in which recording and reproduction are effected through disks the records of the one class of
20 machines are useless for the other.

It is one of the objects of my invention to adapt the ordinary mechanism of a phonograph or graphophone to use with gramophone-records, so that the machine may be
25 used with either the cylindrical records appropriate to that class of machines or with the disks now adapted for use only with gramophones.

It is also an object of my invention to effect this result without making any change or alteration in the regular mechanism of the phonograph or graphophone, so that the temporary conversion of the machine can be effected without removing any of its parts or
35 changing their adjustment.

It is also an object of my invention to enable this conversion to be effected by simple attachments, which can be easily and quickly applied or removed without the exercise of
40 more than common intelligence.

In carrying out this part of my invention I employ two attachments—first, a power-transmitter, which is applied to the phonograph-cylinder or other rotating part of the
45 machine and is adapted to transmit power to the gramophone-disk, and, second, a disk-support, which is applied to a stationary part of the machine and is adapted to support the disk or its table in driving connection with
50 the power-transmitter. In my preferred construction these attachments are very simple and may be applied or removed with great facility.

In the accompanying drawings, Figure 1 is a front elevation of a phonograph having my
55 gramophone attachment applied thereto. Fig. 2 is a transverse section and a perspective view of the power-transmitter, and Fig. 3 is a perspective view of the disk-support.

a is the rotary cylinder of the phonograph
60 or graphophone, which is operated in the usual manner.

b is the power-transmitter for transmitting motion from the cylinder *a* to the gramophone-disk *c*. As shown, the power-transmitter consists of a ring *d*, adapted to fit the rotary cylinder *a* and having its periphery provided with a frictional driving-surface *e*, which is preferably formed of a ring of soft rubber set
65 in an annular groove in the ring.

f is an upright adapted to be attached to any stationary part of the machine or its frame. I have shown it provided at the lower part with a notch *f'*, adapted to engage the screw *f*² in the end support *a'* of the cylinder-shaft; but any suitable means of attachment may be employed.
70 75

g g are radial arms carried by the upright *f* and provided with loose rollers *g'*. These preferably consist of rubber disks loosely supported on the ends of the arms *g g* by screws
80 *h*. To permit the radial arms to be adjusted vertically on the upright *f*, I have shown them carried by an adjustable collar *g*², provided with a set-screw *g*³.
85

In applying my attachment to a phonograph or graphophone the sound-box or lever is lifted and the power-transmitter *b* is slipped on the cylinder *a*. The upright *f* is secured in place, and the disk *c* is placed over
90 the upright, resting on the frictional driving-surface *e* of the power-transmitter and the rollers *g g*. Now when the cylinder *a* is operated the disk will be rotated by the power-transmitting connection *b* acting frictionally
95 on the under side of the disk. While I have spoken of the disk as being in frictional driving contact with the power-transmitter, it is to be understood that the disk may be placed on a rotary table, and this table may be supported on the power-transmitting surface *e*
100 and the radial arms *g* and driven by frictional contact.

I do not mean to limit myself to the particular form of power-transmitter shown, as
105 my invention includes any form of power-

transmitting devices operated by the phonograph or graphophone and driving the gramophone-disk or its supporting-table by frictional contact. The manner of supporting and driving the disk enables it to rise and fall in conformity with any irregularities in its plane, so that the uniformity of the driving action is not affected by irregularities in the plane of the disk. Any suitable sound-box may be used with the gramophone-disk.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. A gramophone attachment for sound recording and reproducing machines, consisting of a power-transmitter adapted to be attached to a driven part of the sound recording and reproducing machine, and a disk-supporter adapted for attachment to a stationary part of the machine having means for supporting the disk in driving connection with the power-transmitter.

2. A gramophone attachment for sound recording and reproducing machines, consisting of a power-transmitter adapted to be attached to a driven part of the sound recording and reproducing machine, and a disk-supporter adapted for attachment to a stationary part of the machine having means for supporting the disk in frictional contact with the power-transmitter.

3. A gramophone attachment for sound recording and reproducing machines, consisting of a power-transmitter adapted to be attached to a driven part of the sound recording and reproducing machine and provided with a frictional driving-periphery, and a disk-supporter adapted for attachment to a stationary part of the machine having means for supporting the disk in frictional driving contact with the power-transmitter.

4. A gramophone attachment for phonographs and the like, consisting of a power-transmitting ring adapted to be applied to the rotating cylinder of the phonograph and provided with a frictional driving-periphery, and a disk-supporter adapted for attachment to a stationary part of the machine having means to support the disk in frictional driving contact with the periphery of the power-transmitting ring.

5. A gramophone attachment for phonographs and the like, consisting of a power-transmitter adapted to be attached to a driven part of the phonograph, and a disk-supporter consisting of an upright adapted to be attached to a stationary part of the machine provided with radial supports adapted to support the disk in driving connection with the power-transmitter.

6. A gramophone attachment for phonographs and the like, consisting of a power-transmitter adapted to be attached to a driven part of the phonograph, and a disk-supporter consisting of an upright adapted to be attached to a stationary part of the machine provided with radial arms *g* having rollers *g'*

adapted to support the disk in driving connection with the power-transmitter.

7. The power-transmitting attachment for transmitting power from the cylinder of a phonograph and the like, to a gramophone-disk, consisting of a ring *d* adapted to be applied to the phonograph-cylinder provided with a frictional driving-periphery *e*.

8. The disk-supporting attachment for applying a gramophone-disk to a phonograph and the like, consisting of an upright *f* adapted for attachment to a stationary part of the machine, provided with radial supporting-arms *g*.

9. The disk-supporting attachment for applying a gramophone-disk to a phonograph and the like, consisting of an upright *f* adapted for attachment to a stationary part of the machine, provided with radial supporting-arms *g* carrying rollers *g'*.

10. The disk-supporting attachment for applying a gramophone-disk to a phonograph and the like, consisting of an upright *f* adapted for attachment to a stationary part of the machine, provided with a vertically-adjustable collar carrying radial supporting-arms *g*.

11. In a sound recording and reproducing machine, the combination with a rotating driving-ring having a frictional driving-periphery, of a disk-support having radial supporting-arms adapted to support the disk in frictional driving contact with the periphery of the driving-ring.

12. The herein-described improvement in graphophones comprising a mandrel, means for rotating the same, a disk plate, and means carried by said mandrel for rotating said disk plate.

13. The herein-described improvement in graphophones comprising a mandrel, means for rotating the same, a disk plate, a pivoted base-plate supporting the same, and means carried by said mandrel for rotating said disk plate.

14. The herein-described improvement in graphophones comprising a mandrel, means for rotating the same, a base-plate having a bearing-sleeve, a disk plate having its shaft mounted in said sleeve, and means carried by said mandrel for rotating said disk plate.

15. The herein-described improvement in graphophones comprising a mandrel, means for rotating the same, a disk plate, and a removable member carried by said mandrel arranged to engage and rotate said disk plate.

16. The herein-described improvement in graphophones comprising a mandrel, means for rotating the same, a removable ring for said mandrel, and a disk plate arranged to have frictional engagement with said ring.

In testimony of which invention I have hereunto set my hand.

GEORGE H. HALL.

Witnesses:

J. L. APPLETON,
H. F. MILLER.

No. 724,435.

PATENTED APR. 7, 1903.

G. K. CHENEY.

SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

APPLICATION FILED APR. 16, 1902.

NO MODEL.

Fig. 5.

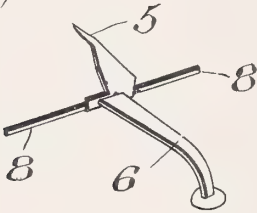


Fig. 6.

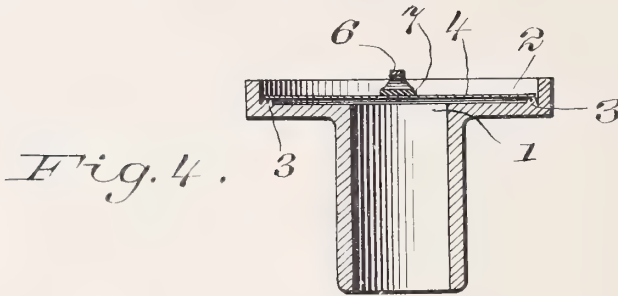
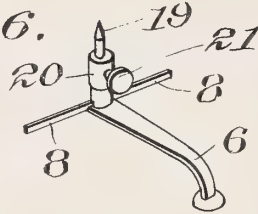
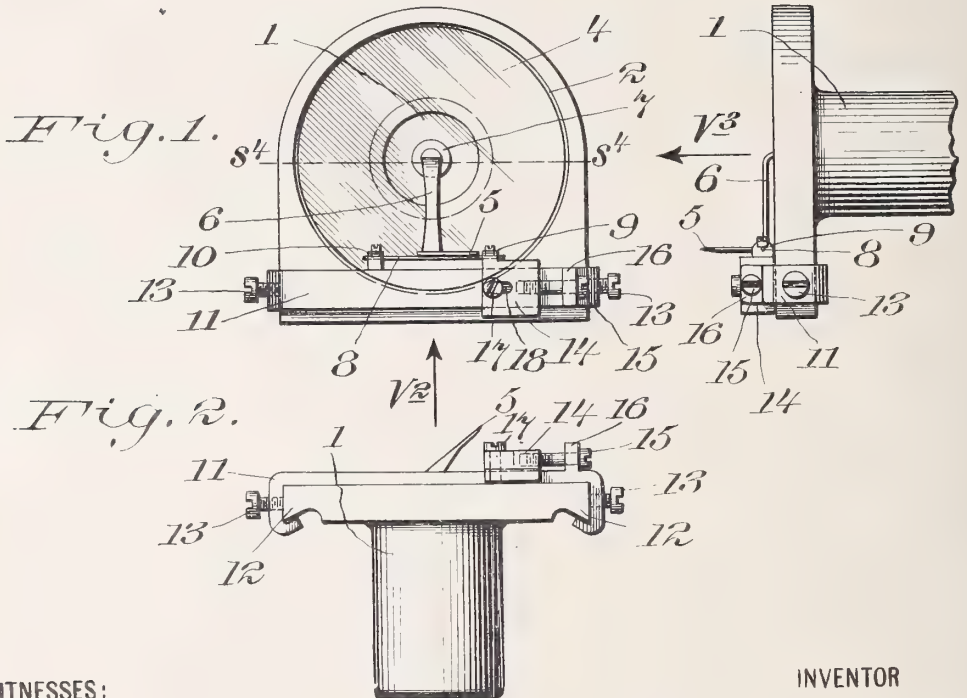


Fig. 3.



WITNESSES:

R. E. Carson
W. H. Humphrey.

INVENTOR

George K. Cheney
BY
A. R. Richards
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 724,435, dated April 7, 1903.

Application filed April 16, 1902. Serial No. 103,153. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the city of New York, county of New York, State of New York, have invented certain new and useful Improvements in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a specification.

My invention relates to sound recording and reproducing machines, and more specifically to certain improvements in the construction of the sound-box employed therein.

One embodiment of the invention is illustrated in the accompanying sheet of drawings, throughout the several views of which like reference-numerals indicate corresponding parts.

In the drawings, Figure 1 is a plan view of the lower side of the sound-box. Fig. 2 is a side elevation thereof as viewed in the direction indicated by the arrow V². Fig. 3 is a similar view looking in the direction indicated by the arrow V³. Fig. 4 is a central vertical sectional view taken on the line s⁴s⁴ of Fig. 1. Fig. 5 is a detail view in perspective of the recording-point and its supporting-arm, and Fig. 6 is a similar view of an interchangeable reproducing-stylus.

Referring to the drawings, the sound-box casing is represented as provided in the usual manner with a tubular extension 1 for connection with the horn and a chamber 2 for the diaphragm. On the bottom of this chamber an annular seat 3 is formed, to which the diaphragm 4 is adhesively secured by wax or other suitable material. The seat may be formed by a single head having a concave face or by two heads concentrically arranged side by side. In either case a retaining-groove is provided for an annulus of wax, on which the diaphragm is placed while the wax is soft and secured as it hardens.

The recording-point 5 is formed in part with or rigidly secured to approximately an L-shaped arm 6, the short member of which is waxed to a disk 7, of rubber or other elastic material, and this disk is in turn secured directly to the diaphragm, as shown in Fig. 4. The free end of the long member of the L-shaped arm is secured centrally to a wire or strip 8 of highly resilient metal, preferably

steel, which has its ends removably secured by screws in lugs 9 10 of a movable carriage 11. The carriage has two adjustments, one to regulate the tension of the arm on the diaphragm and the other to regulate the tension of the wire or strip which carries the stylus-arm. The adjustment of the carriage proper is effected by mounting the same on guides 12 12, formed in part with the sound-box casing, there being set-screws 13 13 for securing the carriage in any position to which it may be adjusted on the guides. The second adjustment is effected by mounting a block 14 upon the carriage proper and shifting it as may be required by means of a screw 15, turning freely in a lug 16. The block 14 straddles the carriage and is secured as adjusted and limited in movement by a set-screw 17, working in a slot 18. The lug 9, in which one end of the wire 8 is secured, is formed in part with the block 14, and the lug 10 is integral with the carriage. Thus it will be seen that when the block is adjusted by the screw 15 the wire may be drawn taut and tensioned as may be required and the block thereafter secured by the screw 17.

The sound-box constructed as above described may be used either in recording or reproducing sound; but owing to the form of point or stylus employed it is specially adapted as a recorder. In order to obtain good results, it is necessary in reproducing to change the needle frequently, and I therefore preferably substitute for the recording-point an ordinary straight needle or stylus 19, mounted, however, in the same manner as shown in Fig. 6, but removably secured in a socket or tubular extension 20 of the L-shaped arm by a set-screw 21.

In use either in recording or reproducing the diaphragm is practically free to vibrate throughout its entire area, and the full force and effect of the sound-waves are thereby obtained. The wax on which the diaphragm is seated serves to elastically connect the same with its seat and has more or less yielding action as the diaphragm vibrates. Thus mounted the diaphragm is rendered extremely delicate and sensitive, and as a result it responds fully to the shorter sound-waves, which aid materially in improving the tone reproduced by giving it depth, richness, and a well-

rounded quality generally. The use of an elastic medium between the stylus-arm and the diaphragm also contributes largely in improving the tone quality, as it yields on the outward vibration of the diaphragm, and thereby affords greater amplitude of movement with a corresponding increase of volume and clearness of tone on reproduction. Important advantages are secured in mounting the stylus-arm on a spring-metal wire in the manner described. The construction is extremely simple, and the readiness and facility with which the wire may be tensioned and such tension varied as desired proves both effective and satisfactory. This form of spring acts both ways and serves to yieldingly maintain the stylus and its arm in a central position. A slight shifting of the main carriage serves to complete the adjustment of the needle and regulate the pressure of the needle-arm upon the diaphragm.

The operation and adjustments will be apparent from the foregoing description.

It will be understood that I do not wish to limit myself to the exact construction and relative arrangement of parts herein illustrated and described, as various changes might be made without departing from the spirit and scope of my invention. For example, the form of the sound-box casing might be changed, also the arrangement of the diaphragm and its seat therein, without necessarily dispensing with the elastic medium employed as a yielding connection between the same. Other means for effecting the adjustment of the stylus with relation to the diaphragm and for mounting the stylus-arm might also be employed; but all such changes I consider obvious and immaterial variations of form and not of substance and still within the meaning of the present invention.

Having therefore described my invention, I claim—

1. The combination of a diaphragm, a stylus phonetically connected therewith, a spring-wire carrier for the stylus, and means for stretching the wire to vary its tension. 45

2. The combination of a diaphragm, a stylus phonetically connected therewith, a torsion-spring on which the stylus is mounted, supports for the spring and means for adjusting the supports to regulate the tension of the spring. 50

3. The combination of a diaphragm, a stylus phonetically connected therewith, a spring-wire carrier for the stylus and fastenings for the ends of the wire, one of said fastenings being adjustable to vary the tension of the wire. 55 60

4. The combination of a diaphragm, a spring-mounted stylus phonetically connected therewith, and a carrier for the stylus adjustable in a plane parallel with the face of the diaphragm. 65

5. The combination of a diaphragm, a stylus coöperating therewith, a spring-wire on which the stylus is mounted, an adjustable carrier for the wire and means on the carrier for varying the tension of the wire. 70

6. The combination of a sound-box provided interiorly with an annular seat, a diaphragm elastically secured to the seat, a stylus coöperating with the diaphragm, a spring-wire on which the stylus is mounted, an adjustable support for the wire and means for varying the tension thereof. 75

Signed at New York city, New York, this 15th day of April, 1902.

GEORGE K. CHENEY.

Witnesses:

W. H. PUMPHREY,
L. E. PEARSON.

For patent No. 725,857 to Thomas H. Macdonald, issued April 21, 1903 for Speed Regulator and Stop Mechanism, see the last patent in this Volume.

7248 18

No. 725,878.

PATENTED APR. 21, 1903.

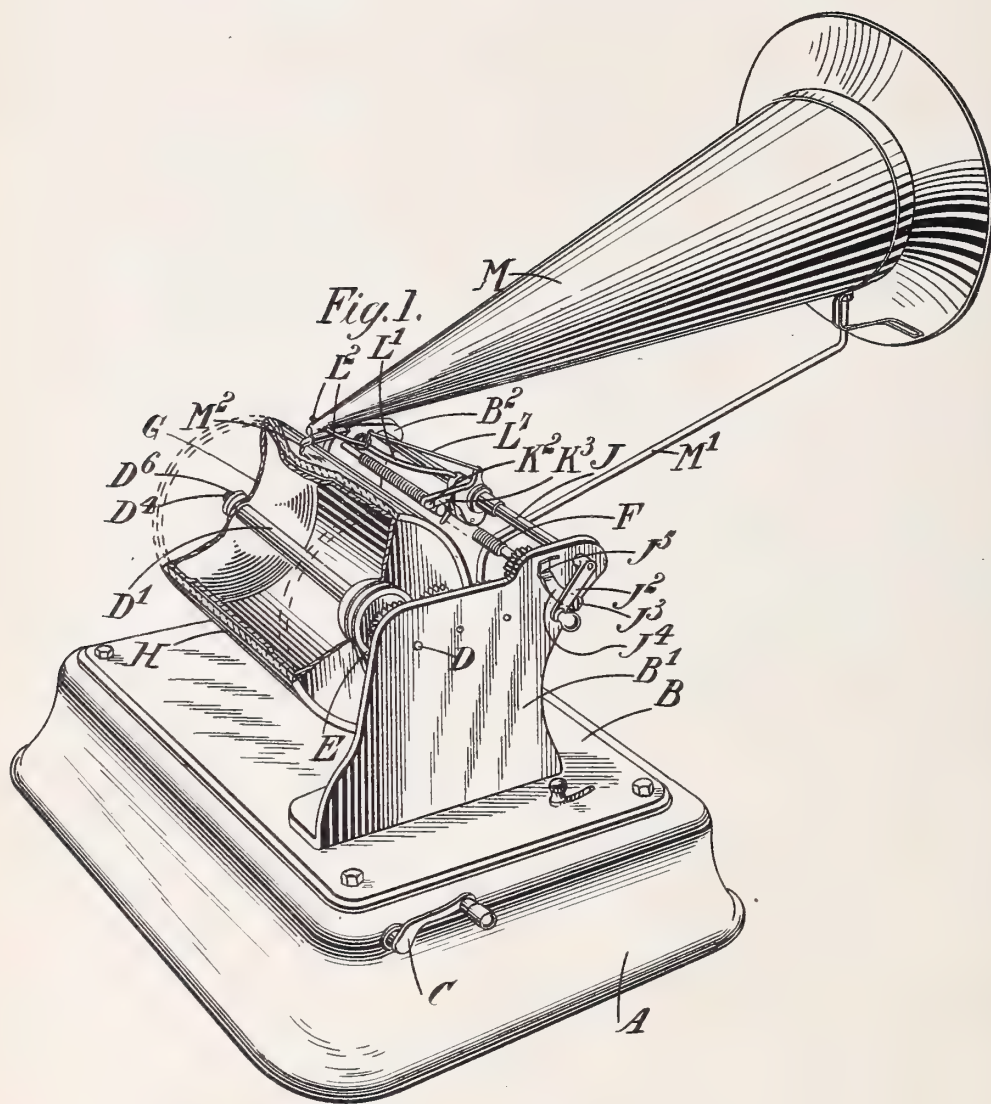
W. C. RUNGE.

GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

APPLICATION FILED DEC. 13, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Arthur A. Bryant
A. Mitchell

Inventor.
Walter C. Runge
by Watson & Watson Attys.

W. C. RUNGE.
GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

APPLICATION FILED DEC. 13, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

FIG. 2.

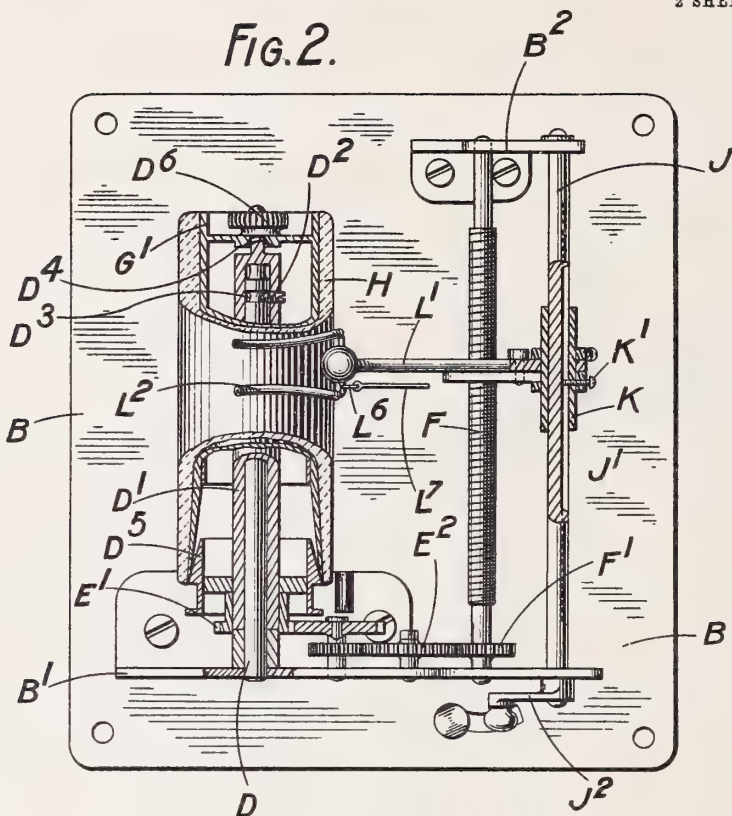
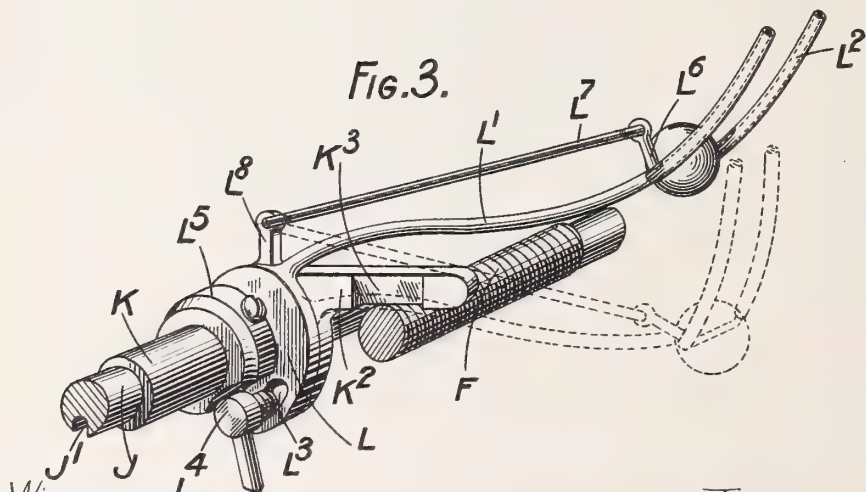


FIG. 3.



Witnesses:

Arthur L. Bryant.
C. W. Clement.

Inventor

W. C. Runge
by Watson Watson atty.

UNITED STATES PATENT OFFICE.

WALTER C. RUNGE, OF LONDON, ENGLAND.

GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 725,878, dated April 21, 1903.

Application filed December 13, 1901. Serial No. 85,824. (No model.)

To all whom it may concern.

Be it known that I, WALTER C. RUNGE, a citizen of the United States of America, residing at London, England, have invented certain new and useful Improvements in or Relating to Graphophones, Phonographs, or the Like, (for which applications for Letters Patent have been made in Great Britain under Nos. 20,920 and 20,921, both dated October 18, 1901,) of which the following is a specification.

This invention relates to graphophones, phonographs, and the like, and has particular reference to instruments which are intended to be used with record-cylinders of various diameters. In instruments of this type the position of the smaller or stylus-carrying end of the sound-trumpet has to be varied to suit the diameter of the record in use, and according to this invention I provide what may be termed an "adjustable locking device," whereby the carrier or guide for the trumpet may be readily fixed in the desired position.

In the accompanying drawings, Figure 1 is a perspective view with parts broken away, showing one construction of graphophone according to this invention. Fig. 2 is a plan of the same. Fig. 3 is a perspective view showing details of the locking device.

With reference first to Fig. 1, A is a hollow base which contains the motor-driving mechanism for the instrument, attached to the under side of a base-plate B. Details of the motor itself are not shown, as they form no part of the present invention. It will be understood that the motor may be, say, a clock-work-train of the ordinary type driven by a spring, which can be wound up by means of the handle C.

Upon the base-plate B are standards B' and B², serving to support the various parts of the machine. Carried upon a spindle D, rigidly held in the standard B', is a sleeve D', free to turn about the spindle D, but prevented from longitudinal movement thereon by means of a screw D², which engages with a groove D³ in the spindle. This sleeve D' forms the axle for the record-mandrel, and it is provided with a screw D⁴ at its outer end and a cone D⁵ near the end adjacent to the standard B'. The sleeve D' is driven from

the motor by means of a belt E, which passes below the base-plate B to a suitable pulley forming part of the motor, and a gear-wheel E', attached to the sleeve D', drives, through a train of wheels E², another wheel F', attached to a leading-screw F, which is mounted free to turn between the standards B' and B².

Two record-mandrels of different diameters are provided, one, the larger, being shown at G in Fig. 1 and the other at G' in Fig. 2. Each of these mandrels is provided at one end with a slightly-coned mouth which fits over the conical portion D⁵, attached to the sleeve D', and at the other end with an end plate, which is furnished with a central hole through which the screw D⁴ passes, a nut D⁶ serving to secure the mandrel in position. The record H is carried friction-tight upon the mandrel in the usual way.

Supported between the standards B' and B² and free to turn therein is a guide-bar J, furnished with a slot J' and having a handle J² attached to it at one end. This handle J² normally rests against a stop J³, Fig. 1, and can be moved over a spring J⁴, which presses against its under surface, this spring being bent, as at J⁵, at one end, so as to receive and hold the handle J² in a definite position when it is moved. Sliding freely upon the guide-bar J is a sleeve K, having attached to it by a screw K' an arm K², part of which is formed as a knife-edge K³ to engage with the thread of the leading-screw F. The screw K' passes through the boss forming part of the arm K² and extends through the sleeve K into the groove J', thus preventing the sleeve from rotating upon the guide-bar J. Mounted upon the sleeve K adjacent to the arm K² is a disk L, supporting a carrier-arm L', the other end of which bears a fork L², serving as a guide for the smaller end of the sound-trumpet M. This sound-trumpet is pivotally supported at its larger end by a bent arm M', and when the instrument is in operation the stylus M², carried at the lower end of the trumpet, rests in the grooves in the record H. As the instrument is made to take records of two diameters, it is necessary that the position of the carrier-arm L' should be adjustable relatively to that of the arm K². This is accomplished by making the disk L free to turn

about the sleeve K and providing it with a slot L³, through which a screw L⁴ passes into a tapped hole in the boss carrying the arm K². If this screw L⁴ be loosened, the carrier-arm L', which is kept from lateral movement on the sleeve K by means of a collar L⁵, may be turned around upon the sleeve as far as the extent of the slot L³ permits. Preferably the slot is of such a length that the carrier-arm L' is in its proper position to suit one record when the tightening-screw L⁴ is at one end of the slot and in a corresponding position to suit the other record when the screw is at the other extremity of the slot. As the arm L' and the sound-trumpet are of different lengths and turn about different centers, the arms L² tend to shift relatively to the adjacent portion of the sound-trumpet when the two members mentioned are moved from one position to the other. This would be disadvantageous, as owing to the fact that the sound-trumpet is tapered or conical there would be a variation in the space between the guiding forked arms and the walls of the trumpet. To obviate this, the forked arms L² are made to turn in the end of the carrier-arm L', so that they may be adjusted to occupy approximately the same position whether the instrument is used with a large record or a small one. This adjustment may be made by hand; but it is preferably accomplished automatically by attaching to the forked arms L² a small rod or crank L⁶, which is linked by a rod L⁷ to a lug L⁸, attached to the back portion of the arm K². By thus linking the forked arms L² to a stationary point eccentric to the axis about which the carrier-arm L' turns it is possible to keep the forked arms L² in approximately the same position relatively to the sound-trumpet whether the trumpet be raised for use with a record of large diameter or lowered for use with a smaller record.

When it is desired to place the instrument out of action—that is, to withdraw the point of the stylus M² out of contact with the record H—the handle J² is moved until it engages with the bent portion J⁵ of the spring J⁴. This partially rotates the guide-bar J and the sleeve K and lifts the knife-edge K³ out of engagement with the leading-screw F, while the same movement causes the forked arms L² to raise the stylus clear of the record. When in operation, the weight of the carrier-arm L' and the other members mounted upon the sleeve K is sufficient to keep the knife-edge K³ in engagement with the thread of the leading-screw F.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a graphophone the combination of a guide for the sound-trumpet, a support whereon said guide is capable of limited rotary movement, means for imparting a lateral movement to the guide and its support, and means for securing said guide in any one of a plu-

rality of radial positions relatively to its support substantially as and for the purpose set forth.

2. In a graphophone the combination of a driven leading-screw, a guide-bar mounted parallel thereto, a sleeve free to slide along but not to rotate upon said guide-bar, an operative connection between the sleeve and the leading-screw, a guide for the sound-trumpet mounted upon the sleeve and capable of limited rotary movement thereon and means for securing the guide in any one of a plurality of radial positions relatively to the sleeve substantially as and for the purpose set forth.

3. In a graphophone the combination of a driven leading-screw, a guide-bar mounted parallel thereto, a sleeve free to slide along but not to rotate upon said guide-bar, an arm mounted upon said sleeve and adapted to engage with the leading-screw, a disk also mounted upon the sleeve and capable of limited rotary movement thereon, a carrier-arm attached to said disk and provided with a forked guide for the sound-trumpet and means for securing the disk in any one of a plurality of radial positions substantially as and for the purpose set forth.

4. In a graphophone the combination of a driven leading-screw, a guide-bar mounted parallel thereto, a sleeve free to slide along but not to rotate upon said guide-bar, an arm mounted upon said sleeve and adapted to engage with the leading-screw, a disk also mounted upon the sleeve and capable of limited rotary movement thereon, a carrier-arm attached to said disk, forked arms pivotally mounted at the free end of the carrier-arm and means for securing the disk in any one of a plurality of radial positions substantially as and for the purpose set forth.

5. In a graphophone the combination of a driven leading-screw, a guide-bar mounted parallel thereto, a sleeve free to slide along but not to rotate upon said guide-bar, an arm mounted upon said sleeve and adapted to engage with the leading-screw, a disk also mounted upon the sleeve and capable of limited rotary movement thereon, a carrier-arm attached to said disk, forked arms pivotally mounted at the free end of the carrier-arm, a link connecting the forked arms with a stationary point eccentric to the axis about which the disk turns and means for securing the disk in any one of a plurality of radial positions substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WALTER C. RUNGE.

Witnesses:

ARCH J. FRENCH,
HARRY B. BRIDGES.

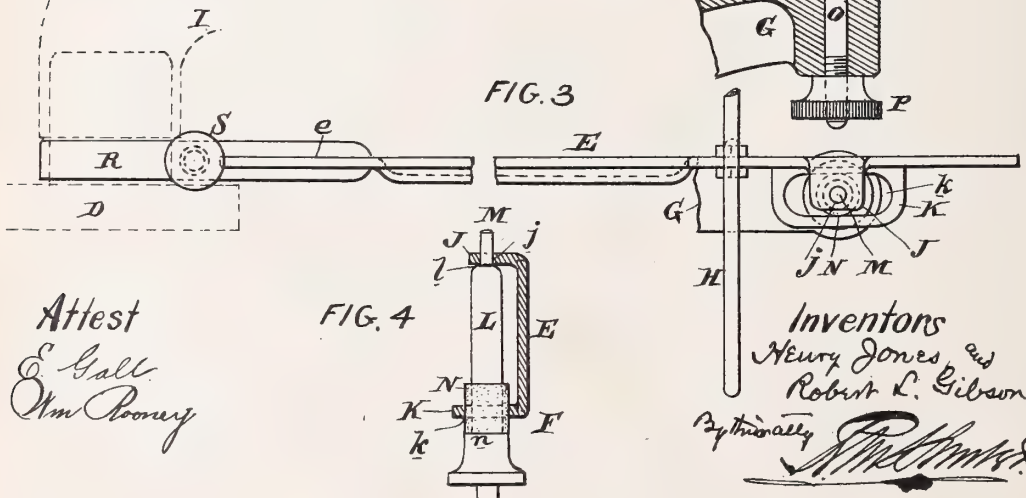
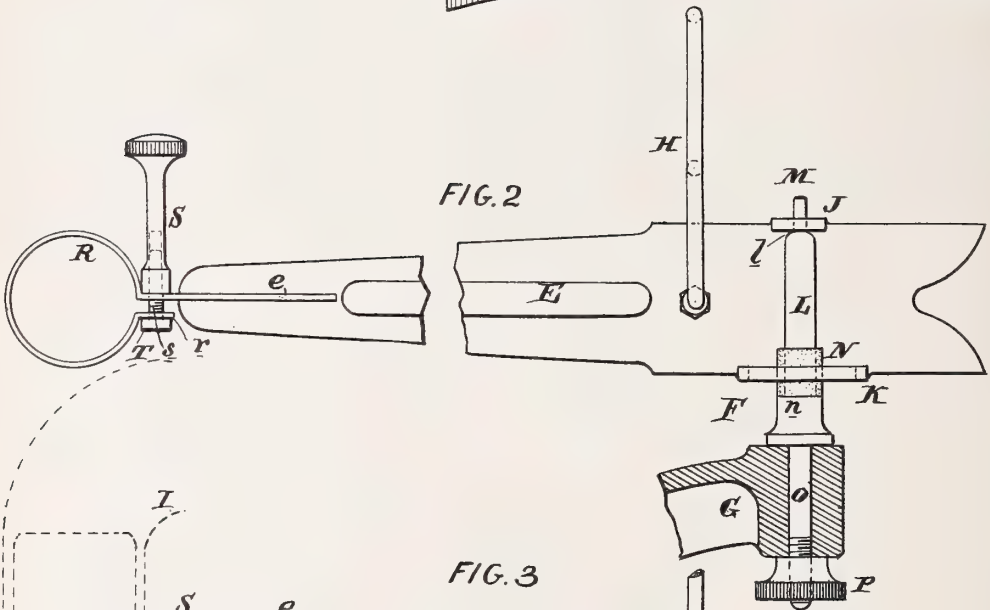
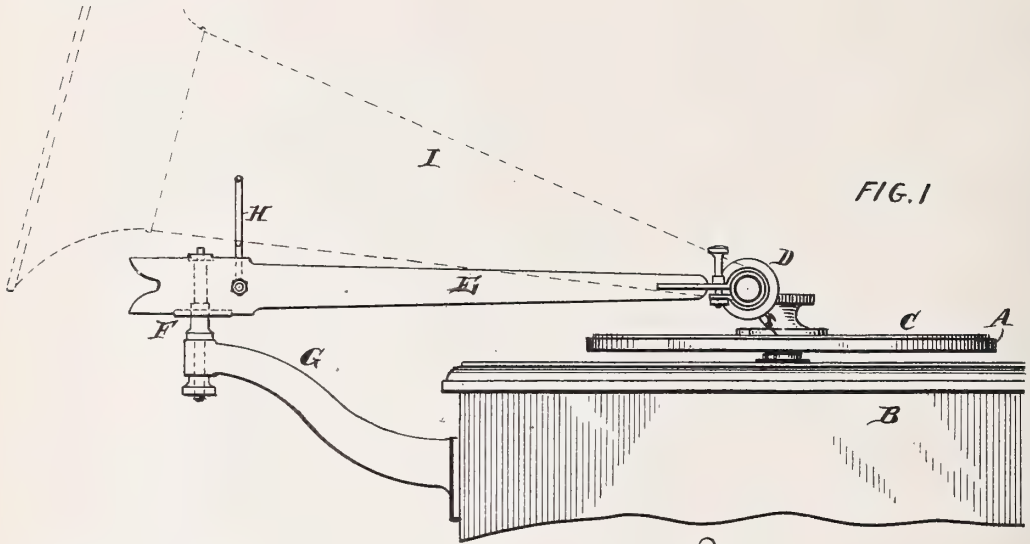
No. 726,937.

PATENTED MAY 5, 1903.

H. JONES & R. L. GIBSON.
GRAMOPHONE OR PHONOGRAPH.

APPLIOATION FILED AUG. 13, 1902.

NO MODEL.



Attest
E. Gall.
Wm Rooney

Inventors
Henry Jones and
Robert L. Gibson
By *thorally* *W. H. H. H. & Co.*

UNITED STATES PATENT OFFICE.

HENRY JONES AND ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

GRAMOPHONE OR PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 726,937, dated May 5, 1903.

Application filed August 13, 1902. Serial No. 119,539. (No model.)

To all whom it may concern:

Be it known that we, HENRY JONES and ROBERT L. GIBSON, of the city and county of Philadelphia and State of Pennsylvania, have
 5 invented an Improvement in Gramophones and Phonographs, of which the following is a specification.

Our invention has reference to improvements in gramophones and phonographs; and
 10 it consists of certain improvements, which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

Heretofore it has been customary in gramophone instruments to support the reproducer and horn upon an arm universally pivoted, so as to enable the style of the reproducer to follow the grooves of the record-tablet and at the same time to provide great freedom of
 15 adjustment to enable the arm to be readily handled when removing the reproducer from the record-tablet or when placing it in operative position. In the construction heretofore employed in instruments of this class
 20 considerable difficulty has arisen from the fact that the character of universal joint between the swinging arm and its support has rendered it liable to interference with the free movement of the arm and the reproducer,
 25 which in some instances produces such a resistance as to force the style of the reproducer to jump from one groove into the next, with the result of not only interfering with the reproduction of sound, but also of damaging
 30 the record-tablet, so that it is liable to cause a repetition of this same defect in the action of the reproducer when the style again reaches the same place in the grooves. These defects have resulted largely from the fact that
 35 the pivot connections were of such a nature that fairly tight joints were necessary to obviate excessive loose play or rattling and that such tightness of the joints required considerable accuracy in fitting, which in numerous instances produced such binding as
 40 to create the defects pointed out above. Any material resistance to the lateral swinging of the supporting-arm greatly interferes with the perfect articulation of the reproducer, and consequently in the instruments as above
 45 constructed the articulation has not been as perfect as it should be.

The object of our invention is to overcome the objections existing in this class of instrument, and this we accomplish by a form of
 55 pivot for the arm which while exceedingly strong and simple at the same time offers the least possible resistance to the movement of the arm and the reproducer under the influence of the grooves of the record-tablet. This results in the most perfect reproduction
 60 since it gives the record-grooves every opportunity to properly act upon the reproducer-style for the purpose of reproducing the proper sounds or articulations and without
 65 excessive expenditure of energy in causing the swinging arm to move about its pivot connections. The result is not only far better articulation, but also greater life to the record-tablet.

In carrying out our invention in its preferred form we provide an upright stud at the proper distance from the record-tablet and combine therewith the universal jointed
 70 arm to which the reproducer and horn are attached, the pivot connection between the stud and arm consisting, essentially, of a hole in the upper part of the arm adapted to receive
 75 the small upper end of the stud and rest upon a shoulder thereon and a lower longitudinal slotted portion which fits about the stud at a
 80 considerable distance below the upper pivot-point and so as to act as a longitudinal guide to permit vertical motion of the free end of the arm and at the same time lateral swinging
 85 thereof about the small end of the stud on the pivot. From this construction it is seen that the usual double pivots customarily arranged at right angles to each other are dispensed with, and a single pivot with capacity
 90 for universal adjustment is employed in lieu thereof.

Our invention also comprehends details of construction, which, together with the above-mentioned features, will be better understood
 95 by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a gramophone instrument with a portion broken away and the horn shown in dotted lines. Fig. 2 is a
 100 side elevation of the supporting-arm and its pivot, the middle portion of the arm being broken away. Fig. 3 is a plan view of same, and Fig. 4 is a vertical section of the arm ad-

jacent to the stud and showing the stud in elevation.

A is the revolving disk of a gramophone instrument, and B is the case containing the usual clockwork for rotating the disk.

C is the record tablet or disk removably clamped upon the revolving disk A.

G is a rigid arm bolted to the side of the case B and to the outer end of which is clamped the upright stud L. This stud consists of a body part rounded at its upper end, as at *l*, and terminating in an upright small bearing-pin M. It also has a bearing N, preferably of vulcanized fiber or other non-metallic substance, encircling the stud and resting upon an enlarged part or shoulder *n* at the base. The stud is further provided with a shank O, which fits through a hole in the end of the fixed arm G and is clamped therein by means of a screw-threaded nut P. The stud is in this manner rigidly supported upon the end of the arm G.

E is the swinging arm and may be of any suitable material, but preferably of sheet metal. It is hinged to the stud L in the following manner: The upper edge of the arm at one end is bent transversely to form a lug J, having a hole *j*, which receives the pin M of the stud L. This lug J rests upon the rounded upper shoulder *l* of the stud and has its hole fitting with sufficient looseness upon the pin M to permit the arm E to be rocked in a vertical plane. The roundness of the shoulder *l* also permits of this motion to the arm. The lower part of the arm has its edge bent laterally to form a slotted lug K, the slot *k* therein being the proper size to receive the part N of the stud. The length of the slot is in the direction of the length of the arm and forms a guide upon the part N of the stud, and consequently permits the vertical movement of the free end of the arm and holds the arm against twisting in a transverse plane. Moreover, the combination between the stud and the lugs on the arm produces a universal joint F, which enables the free end of the arm to be raised and lowered freely and at the same time permits the entire arm to swing about the stud as a center. The motion of the arm is produced with the least possible resistance, since the points of contact of the arm on the stud are exceedingly small and perform the dual function of pivoting the arm for both vertical and lateral motion at its free end. The arm may be strengthened by a longitudinal rib E' stamped up in the metal, if so desired.

The free end of the arm E is provided with a circular clamp R, one end of which is attached to the arm by fitting into a slot *e* therein and being soldered in position and the other end of which is provided with an aperture through which the clamping-screw extends. The clamping-screw *s* passes through holes in the split portion of the clamp. The free end of this screw *s* screws into a clamping-nut S, and the head T rests upon the under surface

of the end *r* of the clamp and prevents the screw from turning. In this manner the cylindrical neck of the reproducer D is clamped in position upon the arm E, as indicated in Fig. 1 and in dotted lines in Fig. 3.

I indicates the horn, which is connected at the small end with the tubular neck of the reproducer and is supported adjacent to the pivot of the arm E by a curved-wire bracket H, clamped to the arm E and of the usual construction.

While we prefer to make the arm E of metal, it is quite evident that the same may be formed of wood, if so desired, the lugs J and K in that case being attached in any suitable manner, the particular material of which our improvements are constructed being immaterial. The vulcanized fiber or non-metallic sleeve N upon the stud is designed to avoid any metallic rattle between the lugs K and the stud; but it is evident that this part of the stud may be of metal or any other material found suitable.

The ends of the slot *k* act as limit-stops for the vertical adjustment of the free end of the arm E. This is important, as when the record-tablet C is being changed it is customary to turn the arm E of the reproducer to one side and let it swing in the air, in which case it is held suspended by the end of the slot *k* resting in contact with the stud.

The important feature of our invention is in having the parts J M and K N at different elevations and above one another, whereby the pin M and the shoulder *l* act to support the arm and definitely locate the axis about which it swings, and the parts K and N hold the arm in proper position and prevent it twisting, the relative levels or vertical positions of these parts being immaterial, so long as they are sufficiently separated to secure the proper results.

While we prefer the construction shown, the details thereof may be modified without departing from the spirit of the invention.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A supporting-arm for the reproducer of a sound-reproducing machine having at its pivoted end transverse parts arranged one above the other and the upper part of which is provided with a hole approximately circular and the lower of which is provided with a slot extending in the direction of the length of the arm, in combination with a fixed stud having at its top a projecting pin adapted to the hole in the arm and a shoulder upon which the transverse part rests to sustain the arm vertically and the lower part of which stud is cylindrical and adapted to fit the slot of the lower transverse part of the arm.

2. A supporting-arm for the reproducer of a sound-reproducing machine having at its pivoted end transverse parts arranged one above the other and the upper part of which is provided with a hole approximately cir-

cular and the lower of which is provided with a slot extending in the direction of the length of the arm, in combination with a fixed stud having at its top a projecting pin adapted to the hole in the arm and a shoulder upon which the transverse part rests to sustain the arm vertically and the lower part of which stud is cylindrical and formed of non-metallic substance and adapted to fit the slot of the lower transverse part of the arm.

3. A supporting-arm for the reproducer of a sound-reproducing machine having at its pivoted end transverse parts arranged one above the other and the upper part of which is provided with a hole approximately circular and the lower of which is provided with a slot extending in the direction of the length of the arm, in combination with a fixed stud having at its top a projecting pin adapted to the hole in the arm and a shoulder curved or ball-shaped upon which the transverse part rests to sustain the arm vertically and the lower part of which stud is cylindrical and adapted to fit the slot of the lower transverse part of the arm.

4. A supporting-arm for the reproducer of a sound-reproducing machine having its pivoted end formed of a metallic plate provided with two laterally-projecting lugs at different elevations one of which is provided with a small aperture of approximately circular shape and the other of which is provided with an elongated aperture or slot, in combination with rigid bearings one of which consists of an upright pin and shoulder adapted to the lug having the circular hole and the other of which is a cylindrical part adapted to the elongated aperture or slot whereby the arm is universally jointed so as to be able to swing vertically and laterally at its free end.

5. A supporting-arm for the reproducer of a sound-reproducing machine having its pivoted end formed of a metallic plate provided with two laterally-projecting lugs at different elevations one of which is provided with a small aperture of approximately circular shape and the other of which is provided with an elongated aperture or slot, in combination with rigid bearings one of which consists of an upright pin and a curved or ball-shaped shoulder adapted to the lug having the circular hole and the other of which is a cy-

lindrical part adapted to the elongated aperture or slot whereby the arm is universally jointed so as to be able to swing vertically and laterally at its free end.

6. A supporting-arm for the reproducer of a sound-reproducing machine having its pivoted end formed of a metallic plate provided with two laterally-projecting lugs at different elevations one of which is provided with a small aperture of approximately circular shape and the other of which is provided with an elongated aperture or slot in combination with rigid bearings one of which consists of an upright pin and shoulder adapted to the lug having the circular hole and a cylindrical part of non-metallic substance adapted to the elongated aperture or slot whereby the arm is universally jointed so as to be able to swing vertically and laterally at its free end.

7. A clamping device of a supporting-arm for the reproducer of a sound-reproducing machine formed of a looped metallic band having one end secured to the arm and the other end free, combined with a screw extending through the end portions of the band and having an angular head resting against a shoulder on one of the end portions to hold it against turning, and an adjusting-socket nut screwed upon the screw and resting against the other end portion of the band and having an outwardly-extending head adapted to be grasped by the hand and free to turn on the band for drawing the two ends of the band together.

8. A universally-jointed arm for a reproducing-machine formed of sheet metal having its free end made with a transverse slot and provided with a clamping-band R having one end fitted into the slot of the arm and the other end free, a clamping-screw for adjusting the free end of the clamp to or from the end which is secured in the slot of the arm, and a hand-nut screwed upon the screw and resting upon the end of the clamp which is secured to the arm.

In testimony of which invention we have hereunto set our hands.

HENRY JONES.

ROBERT L. GIBSON.

Witnesses:

R. M. KELLY,

R. M. HUNTER,

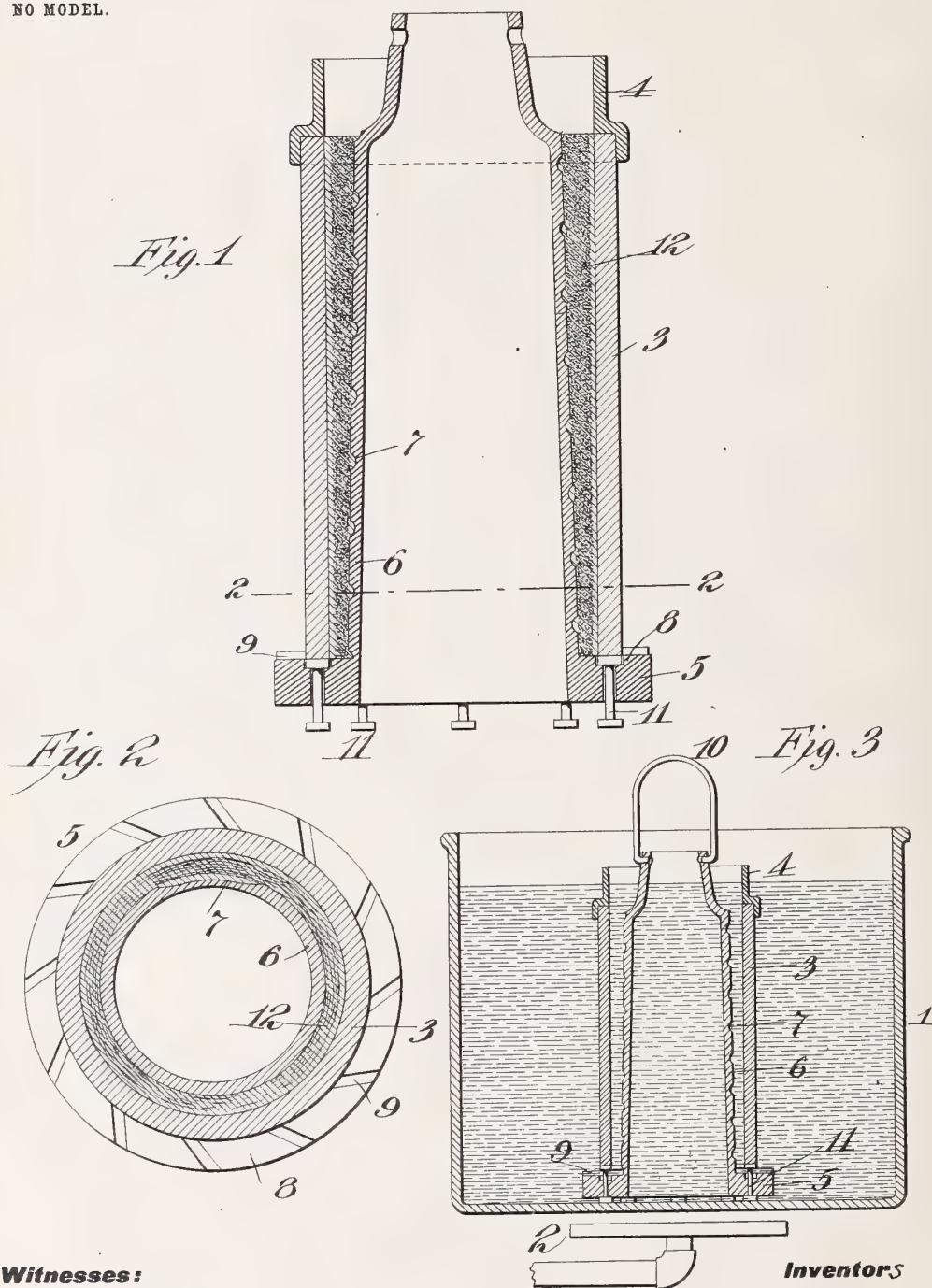
No. 726,965.

PATENTED MAY 5, 1903.

W. H. MILLER & A. N. PIERMAN.
PROCESS OF MAKING SOUND RECORDS OR BLANKS.

APPLICATION FILED NOV. 21, 1902.

NO MODEL.



Witnesses:

Jas. F. Coleman
Geo. Robt. Taylor

Inventors

Walter H. Miller
Alexander S. Pierman

by Ayer Edwards & Jones
Attorneys

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NATIONAL PHONOGRAPH COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF MAKING SOUND RECORDS OR BLANKS.

SPECIFICATION forming part of Letters Patent No. 726,965, dated May 5, 1903.

Application filed November 21, 1902. Serial No. 132,218. (No specimens.)

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented a certain new and useful Improved Process of Making Sound Records or Blanks, of which the following is a description.

Our invention relates to an improved process for making sound records and blanks, and especially for making cylindrical sound records and blanks having tapered bores.

Although our invention has been designed particularly for making our improved relatively indestructible composite records and blanks described by us in our application for Letters Patent filed on even date herewith, yet there are features of the present process which can be effectively utilized in the manufacture of records and blanks formed wholly of wax or wax-like material.

The object of our present invention, generally speaking, is to provide a process by which molded records or blanks can be expeditiously produced at low cost and of high character.

The invention resides, in the first place, in the process for molding composite records, consisting in first placing within a mold a layer of fibrous material and then flowing into the mold a wax or wax-like material which impregnates the fibrous material. When the record or blank is cylindrical in form, the process also preferably utilizes a tapered core, around which the fibrous material is first lightly wound before its introduction into the mold.

The invention consists, in the second place, of forming molded cylindrical blanks or records, either composite or not, by arranging a tapered core within a mold and introducing a molten wax or wax-like material into the space between the core and mold from the bottom upwardly, so as to expel air and prevent the formation of air-bubbles in the resulting article of manufacture.

The invention consists, in the third place, of molding a cylindrical wax or wax-like rec-

ord or blank, either composite or not, with an integral molded spiral rib on its interior by flowing a molten wax or wax-like material around a hollow core and within a suitable mold.

The invention further relates to details of procedure connected with the carrying of the process into effect, such as the steps for removing the core from the molded article and for removing the latter from the mold, all as will be hereinafter more fully described and claimed.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional view of a cylindrical mold and tapered core, illustrating a composite cylindrical record formed therein, the parts being in position for the removal of the core; Fig. 2, a sectional view on the line 2 2 of Fig. 1, and Fig. 3 a sectional view showing a dipping-tank containing a wax or wax-like material with a cylindrical mold and tapered core introduced therein and showing the wax or wax-like material filling the space between the core and mold and also filling the hollow core.

In all of the views corresponding parts are represented by the same numerals of reference.

1 represents a tank heated in any suitable way, as by a gas-burner 2, and containing the wax or wax-like material maintained in a molten condition. The level of molten wax-like material is kept approximately constant by adding fresh material when necessary.

3 represents a hollow cylindrical mold. For the manufacture of blanks this mold is smooth on its interior; but for the manufacture of duplicates the mold is provided on its interior with a reverse or negative sound-record obtained in any well-known way.

4 represents a cap which is removably carried by the mold and which prevents material from overflowing the mold in the carrying out of the process, as will be explained.

5 represents a base which carries an integral tapered hollow core 6, formed on its ex-

terior with a spiral groove 7 in order to produce a molded spiral rib in the resulting record or blank. The base 5 is formed with a rim 8, which centers the mold and holds it concentric to the core, and said rim may be formed with grooves 9 therein to facilitate the flow of the molten material beneath the mold when the process is carried out. Engaging the upper end of the core 6 is a light bail 10, which may be removable, if desired, and by means of which the parts are introduced in and lifted from the tank 1. A number of pins 11, headed at both ends, work loosely in the base 5 and support the mold to permit a relative separation of the core and mold when the parts are introduced in the dipping-tank.

In carrying out our invention into effect for the manufacture of composite records or blanks of the type described and claimed in our concurrent application we first wind a layer 12 of fibrous material lightly or loosely around the core 6 and of the desired thickness. This fibrous material is preferably ordinary cotton-batting or cotton-wool; but any other suitable fibrous material may be employed—such as cloth, absorbent paper, blotting-paper, paper-pulp, &c. The core, with its loose wrapping of fibrous material, is now inserted into the mold 3 and the cap 4 placed in position. The parts are now introduced in the dipping-tank until the pins 11 rest on the bottom of the tank or on a suitable support therein, thus permitting the core 6 and base 5 to move relatively to said pins and mold and allowing the molten material to enter the space between the core and mold from the bottom upwardly. This molten material seeps through or is absorbed by the fibrous material, driving all air before it until the level of the liquid is reached. The molten material also enters the hollow core, so that the latter is quickly brought to the temperature of the molten liquid, as is also the case with the mold itself, so that when the parts are removed from the dipping-tank there will be no appreciable congealing of the wax or wax-like material either inside of the core or outside of the mold. As soon as the space between the core and mold is completely filled, the parts are removed, the base 5 first engaging the bottom of the mold to thereby act as a valve to prevent the escape of the molten material from the space between the core and the mold. The core and mold are now dipped in cold water, which effects a rapid setting of the wax or wax-like material adjacent to the core, owing to the thinness of the walls of the latter. When the material has sufficiently set, the core is removed by unscrewing it. The blank or record may now be removed from the mold, either by allowing it to remain until it cools sufficiently to shrink away from the mold, permitting its removal, or (and preferably) the mold is inserted in a water-jacket, so as to be quickly cooled, whereby a more rapid radial contraction of the record

or blank is effected. After the blank or record has been moved from the mold, its ends are finished in any suitable way, completing the manufacture.

While we have designed our improved process particularly for use in connection with the manufacture of composite records of the type invented by us, it will be understood that our process can be effectively carried out in the manufacture of records or blanks made wholly of wax or wax-like material by merely omitting the preliminary winding of a fibrous material around the core, as explained. We also wish to lay especial stress upon that feature of our process consisting in molding a blank or record around a hollow core having a spiral groove therein, because in this way we are able to successfully mold records or blanks having an integral internal spiral rib and to remove the core from the finished article without injuring the latter. If the attempt were made to cast or mold a record or blank around a solid tapered core, the considerable mass of the latter, with its relatively low radiating capacity, would prevent the successful formation of a molded spiral rib of this character.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is as follows:

1. The method of forming phonograph-tablets, that consists of molding a mass of molten record material which is normally hard and friable, throughout and around a mass of loose fibrous material, substantially as set forth.

2. The method of forming phonograph-tablets, that consists of molding a mass of molten record material which is normally hard and friable, throughout and around a loose mass of cotton-wool, substantially as set forth.

3. The process for making composite sound records or blanks which consists in introducing a layer of fibrous absorbent material in a mold, and in flowing therein a molten hard, friable wax or wax-like material to impregnate the fibrous material, substantially as and for the purposes set forth.

4. The process for making composite sound records or blanks which consists in introducing a layer of fibrous absorbent material in a cylindrical mold, and in flowing a hard, friable wax or wax-like material therein to impregnate the fibrous material, substantially as and for the purposes set forth.

5. The process for making composite sound records or blanks which consists in introducing a layer of fibrous absorbent material in a cylindrical mold and around a tapered core therein, and in introducing a molten hard, friable wax or wax-like material into the space between the core and mold to impregnate the fibrous material, substantially as and for the purposes set forth.

6. The process for making composite sound records or blanks which consists in introducing a layer of cotton-wool in a mold, and in

roducing a molten hard, friable wax or wax-like material therein to impregnate the cotton-wool, substantially as and for the purposes set forth.

5 7. The process for making composite sound records or blanks which consists in introducing a layer of cotton-wool in a cylindrical mold and around a tapered core, and in introducing a molten hard, friable wax or wax-like material into the space between said mold and core to impregnate the cotton-wool, substantially as and for the purposes set forth.

10 8. The process for making sound records or blanks which consists in casting a record or blank around a hollow tapered core having a spiral groove therein, and in simultaneously introducing molten material within said core, substantially as and for the purposes set forth.

15 9. The process for making sound records or blanks which consists in casting a molten wax or wax-like material within a mold and around a hollow tapered core having a spiral groove therein, and in simultaneously introducing the molten wax or wax-like material within said core, substantially as and for the purposes set forth.

20 10. The process for making composite sound records or blanks which consists in first lightly wrapping a fibrous absorbent material around a tapered core, then in introducing the core

and fibrous material in a cylindrical mold, and finally in introducing a molten hard, friable wax or wax-like material into the space between the core and mold to impregnate the fibrous material, substantially as and for the purposes set forth. 35

11. The process for making composite sound records or blanks which consists in first lightly wrapping a fibrous absorbent material around a tapered core, then in introducing the core and fibrous material in a cylindrical mold, and finally in introducing a molten hard, friable wax or wax-like material into the space between the core and mold to impregnate the fibrous material, the molten material being introduced from the bottom upwardly, substantially as and for the purposes set forth. 40 45

This specification signed and witnessed this 19th day of November, 1902, and this 31st day of October, 1902, respectively.

WALTER H. MILLER.

ALEXANDER N. PIERMAN.

Witnesses to signature of Walter H. Miller:

HARRY F. MILLER,

S. S. BROWN.

Witnesses to signature of Alexander N. Pierman:

W. J. BUEHLER,

W. PUGH.

717, 718

No. 726,966.

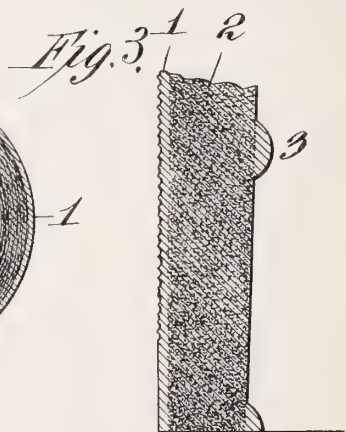
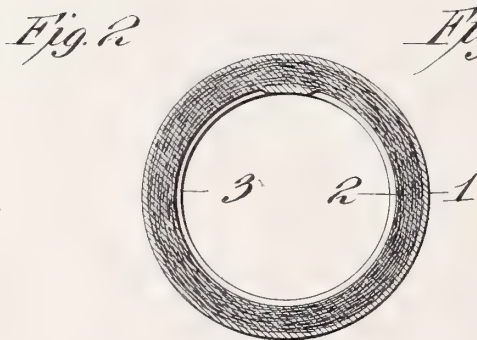
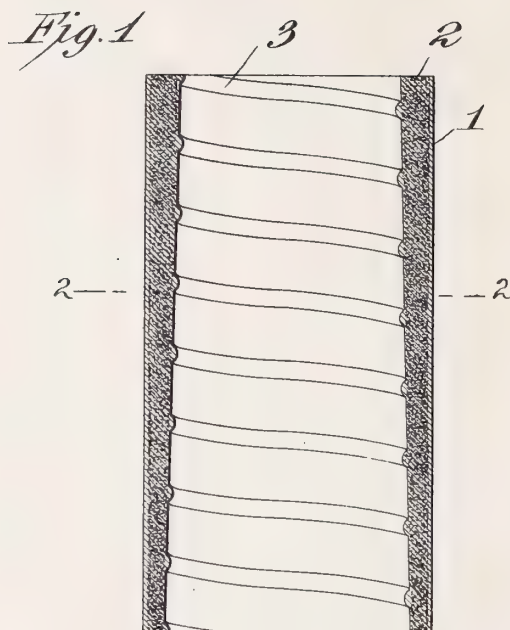
PATENTED MAY 5, 1903.

W. H. MILLER & A. N. PIERMAN.

SOUND RECORD OR BLANK.

APPLICATION FILED NOV. 21, 1902.

NO MODEL.



Witnesses:

Jas. F. Coleman

Geo. Robt Taylor

Inventors

Walter H. Miller

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Attorneys

UNITED STATES PATENT OFFICE.

WALTER H. MILLER, OF ORANGE, AND ALEXANDER N. PIERMAN, OF NEWARK, NEW JERSEY, ASSIGNORS TO NATIONAL PHONOGRAPH COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SOUND RECORD OR BLANK.

SPECIFICATION forming part of Letters Patent No. 726,966, dated May 5, 1903.

Application filed November 21, 1902. Serial No. 132,219. (No model.)

To all whom it may concern:

Be it known that we, WALTER H. MILLER, residing at Orange, and ALEXANDER N. PIERMAN, residing at Newark, in the county of Essex and State of New Jersey, citizens of the United States, have invented a certain new and useful Improvement in Sound Records or Blanks, of which the following is a description.

Our invention relates to improvements in sound records or blanks either in the form of cylinders or flat disks; and our object is to produce a sound record or blank which while presenting a record-surface of a suitable amorphous wax-like material is at the same time sufficiently durable as to be indestructible under ordinary conditions.

Blanks and records made of the ordinary wax or wax-like materials are very fragile and delicate in character and are frequently cracked and broken in the act of placing them in position on a recording or reproducing machine, and in the case of cylindrical blanks or records they frequently become broken or cracked merely by falling from a vertical to a horizontal position, while such records or blanks if allowed to fall from a height of only a few feet on a moderately hard surface will be shattered ordinarily into many pieces, and in any event the delicate record-surface will be destroyed. Our improved record or blank is so durable that it may be dropped or even thrown upon the floor with considerable force without encountering any objectionable injury to its record-surface, and if the latter cracks at all the cracks are so microscopic that they do not affect the reproduction.

Broadly stated, our invention comprises a sound record or blank made of any suitable and ordinary wax or wax-like material and containing in its mass a sufficient bulk of fibrous material as to secure the desired durability, the fibrous material being completely penetrated and inclosed by the wax-like material. The fibrous material which we prefer to use and which we have successfully employed in practice is ordinary cotton-wool or cotton-batting; but other fibrous materials

may be used, such as cloth, absorbent paper, blotting-paper, paper-pulp, &c.

In its preferred form the invention comprises a sound record or blank the recording-surface of which is formed wholly of a suitable amorphous wax or wax-like material and the main portion of which is composed of a fibrous material like cotton-wool, wholly impregnated by the wax-like material, so that the individual fibers of the fibrous material will be surrounded by the wax-like material.

When our invention is employed in connection with cylindrical records or blanks, it preferably also comprises a spiral rib molded on its interior for engaging the usual tapered core, which rib is formed wholly of the wax or wax-like material.

Finally, the invention in its most approved form comprises a duplicate sound-record made of molten wax or wax-like material impregnating a mass of fibrous material and carrying a molded sound-record groove on its record-surface, the latter being preferably amorphous and free of fibers.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a vertical sectional view through a cylindrical record or blank, showing our invention in its preferred form; Fig. 2, a section on the line 2 2 of Fig. 1, and Fig. 3 an enlarged detailed vertical section illustrating a molded sound-record embodying our invention.

In all of the views corresponding parts are represented by the same numerals of reference.

In its preferred form the invention comprises a portion 1, on which the record is formed and which is composed wholly of the usual amorphous wax or wax-like material, and a portion 2, comprising the body of the record or blank, which portion is formed of the same wax or wax-like material impregnating a suitable fibrous material, the entire mass of wax or wax-like material being substantially integral or continuous throughout. When the record or blank is of cylindrical

form, it also preferably comprises a spiral rib 3, made of the same wax or wax-like material. The whole record is molded, and when the invention is utilized in connection with duplicate sound-records the record-groove may be molded contemporaneously with the formation of the record itself. Such a molded record-groove is shown in Fig. 3 by the numeral 4.

Our improved record or blank is made by any suitable process, but preferably by a special process which we have invented and which we have made the subject of an application for Letters Patent filed on even date herewith. In carrying this method into effect we first take a hollow tapered core and wind quite loosely around it a thickness of the fibrous material, preferably ordinary cotton-batting or cotton-wool. This core, with its wrapping of fibrous material, is then inserted in a cylindrical mold, which for the manufacture of blanks is smooth on its interior, while for the manufacture of duplicate sound-records it is provided on its interior with a negative record-groove. A molten wax-like material is now introduced into the space between the mold and core, preferably from the bottom upward, and intimately fills that space, impregnating the fibrous material and practically surrounding each individual fiber of the latter. After the wax-like material has been allowed to set the core is removed, after which the blank or record is removed from the mold by contracting the blank or record radially by a chilling operation.

We find in practice that blanks and records made in accordance with our invention possess all the advantages of blanks and records made wholly of wax or wax-like material so far as superiority of reproduction is concerned, since with our blank or record the record-surface is identical with the record-surfaces of blanks or records made wholly of wax or wax-like material. Our improved blank or record possesses, however, the immense superiority over blanks or records made wholly of wax or wax-like material in being so strong and durable that it may be dropped from a considerable height or be actually thrown upon the floor without breaking or cracking the record-surface, and if any cracks are formed they are so microscopic as not to affect the reproduction. We find, in fact, that with our improved blank or record the latter is actually elastic, due to the presence of the relatively large mass of fibrous material therein, and can be actually collapsed to a considerable extent without injuriously affecting the character of the record-surface.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is as follows:

1. As a new article of manufacture, a sound record or blank composed of normally hard and friable material adapted to be molded and containing within its mass fibrous material to

render the same less friable, substantially as set forth.

2. As a new article of manufacture, a sound record or blank composed of normally hard and friable material adapted to be molded and containing within its mass cotton-wool to render the same less friable, substantially as set forth.

3. As a new article of manufacture, a sound record or blank made of fibrous material, and a hard, friable wax or wax-like material impregnating the fibrous material to surround the individual fibers thereof, substantially as set forth.

4. As a new article of manufacture, a sound record or blank having a record-surface of hard, friable wax or wax-like material, and a main portion formed of a fibrous material completely impregnated with wax or wax-like material, substantially as set forth.

5. As a new article of manufacture, a sound record or blank made of molten hard, friable wax or wax-like material completely impregnating a fibrous material, substantially as set forth.

6. As a new article of manufacture, a sound record or blank made of molten hard, friable wax or wax-like material completely impregnating a fibrous material, with a record-surface formed wholly of such wax or wax-like material, substantially as set forth.

7. As a new article of manufacture, a cylindrical sound record or blank formed of a cylinder of fibrous material completely impregnated with hard, friable wax or wax-like material, substantially as set forth.

8. As a new article of manufacture, a cylindrical sound record or blank formed of a cylinder of fibrous material completely impregnated with hard, friable wax or wax-like material, with a record-surface formed of such wax or wax-like material, substantially as set forth.

9. As a new article of manufacture, a cylindrical sound record or blank formed of a fibrous material completely impregnated with hard, friable wax or wax-like material, and an interior spiral rib integral with the wax or wax-like material, substantially as set forth.

10. As a new article of manufacture, a cylindrical sound record or blank formed of a fibrous material completely impregnated with hard, friable wax or wax-like material, and an interior spiral rib integral with the wax or wax-like material and formed wholly of such wax or wax-like material, substantially as set forth.

11. As a new article of manufacture, a cylindrical sound record or blank composed of fibrous material with a molten hard, friable wax or wax-like material completely impregnating the fibrous material, substantially as set forth.

12. As a new article of manufacture, a cylindrical sound record or blank composed of

fibrous material with a molten hard, friable wax or wax-like material completely impregnating the fibrous material, with a record-surface formed wholly of the wax or wax-like material, substantially as set forth.

13. As a new article of manufacture, a cylindrical sound record or blank composed of fibrous material with a molten hard, friable wax or wax-like material completely impregnating the fibrous material, with a record-surface formed wholly of the wax or wax-like material, and with an interior spiral groove formed wholly of the wax or wax-like material, substantially as set forth.

14. As a new article of manufacture, a duplicate sound-record formed of a fibrous material with a molten hard, friable wax or wax-like material completely impregnating the same, and with a molded record-groove carried by the wax-like material, substantially as set forth.

15. As a new article of manufacture, a sound record or blank composed of cotton-wool completely impregnated with hard, friable wax or wax-like material, substantially as set forth.

16. As a new article of manufacture, a sound record or blank composed of cotton-wool completely impregnated with hard, friable wax or wax-like material, with a record-surface formed wholly of the wax or wax-like material, substantially as set forth.

17. As a new article of manufacture, a cylindrical sound record or blank composed of a cylinder of cotton-wool completely impregnated with hard, friable wax or wax-like material, substantially as set forth.

18. As a new article of manufacture, a cylindrical sound record or blank composed of a cylinder of cotton-wool completely impregnated with hard, friable wax or wax-like material, and with a record-surface formed wholly of wax or wax-like material, substantially as set forth.

19. As a new article of manufacture, a cylindrical sound record or blank composed of a cylinder of cotton-wool completely impreg-

nated with hard, friable wax or wax-like material, with a record-surface formed wholly of wax or wax-like material, and an internal spiral groove formed wholly of wax or wax-like material, substantially as set forth.

20. As a new article of manufacture, a duplicate sound-record composed of a fibrous material, a molten hard, friable wax-like material completely impregnating the same, and a molded record-groove carried by the wax or wax-like material, substantially as set forth.

21. As a new article of manufacture, a duplicate sound-record composed of cotton-wool completely impregnated with a molten hard, friable wax or wax-like material, and a molded record-groove carried by the wax or wax-like material, substantially as set forth.

22. As a new article of manufacture, a duplicate cylindrical sound-record comprising a cylinder of cotton-wool completely impregnated with a hard, friable wax or wax-like material, and a molded record-groove formed in the wax or wax-like material, substantially as set forth.

23. As a new article of manufacture, a cylindrical duplicate sound-record comprising a cylinder of cotton-wool completely impregnated with a hard, friable wax or wax-like material and having a record-surface formed wholly of wax or wax-like material, and a molded record-groove carried within said record-surface, substantially as set forth.

This specification signed and witnessed this 19th day of November, 1902.

WALTER H. MILLER.

Witnesses to signature of Walter H. Miller:

HARRY F. MILLER,
S. S. BROWN.

This specification signed and witnessed this 31st day of October, 1902.

ALEXANDER N. PIERMAN.

Witnesses to signature of Alexander N. Pierman:

W. J. BUEHLER,
W. PUGH.

No. 727,002.

PATENTED MAY 5, 1903.

C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

4 SHEETS—SHEET 1.

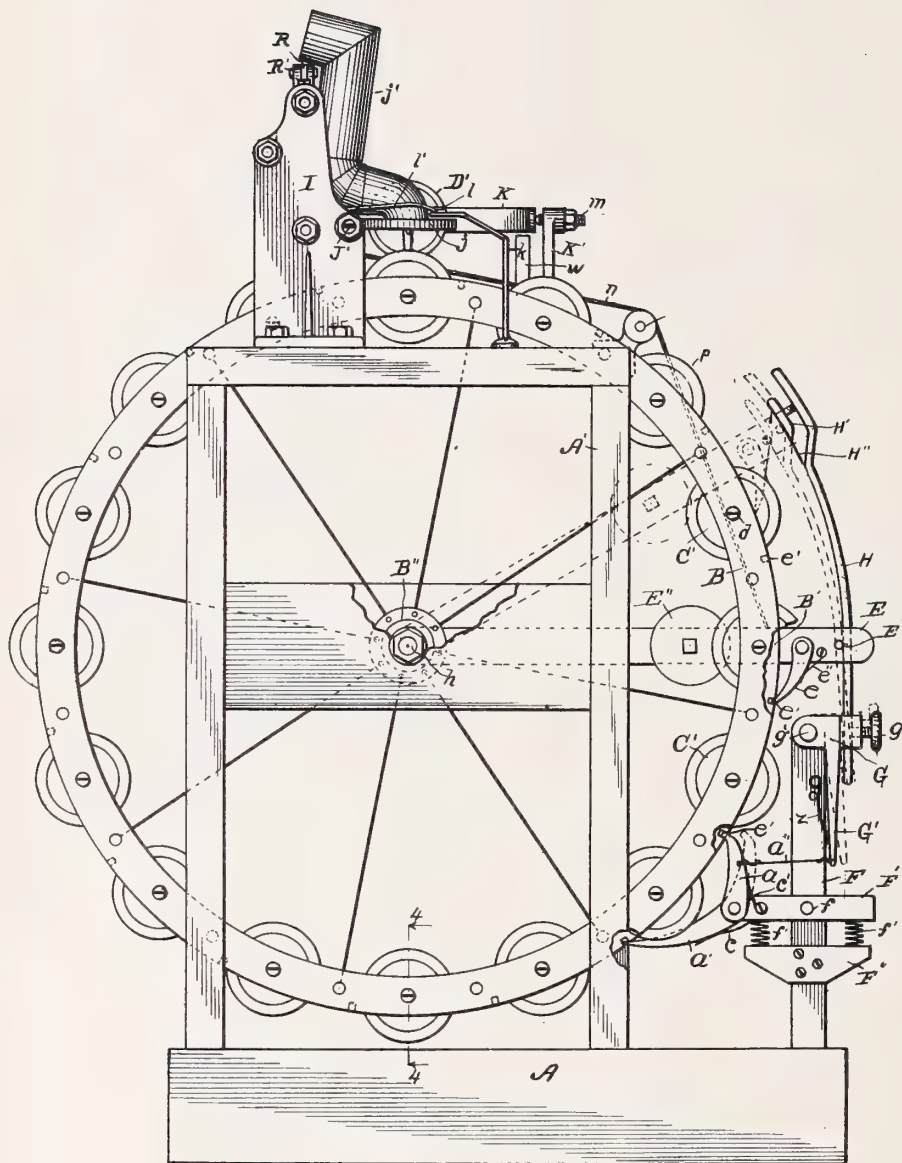


Fig 1

Witnesses:

Etzel A. Teller
Otis A. Paul

Inventor,

Cyrus C. Shigley
By *Fred L. Chappell*
Att'y.

No. 727,002.

PATENTED MAY 5, 1903.

C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

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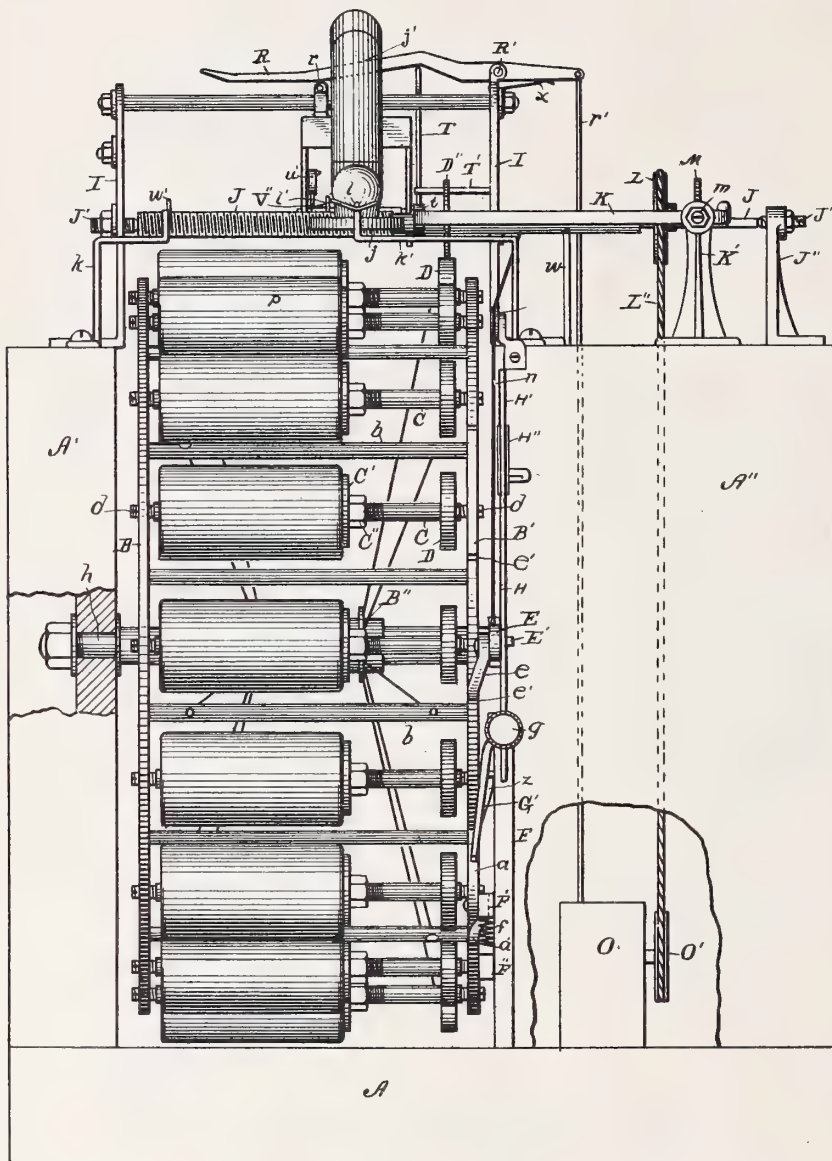


Fig 2

Witnesses:

Orvil A. Teller
Otis W. Earl

Inventor,

Cyrus C. Shigley

By Fred L. Chappell
Att'y.

No. 727,002.

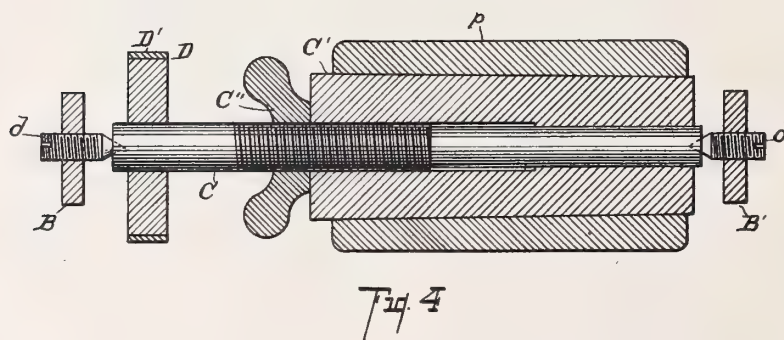
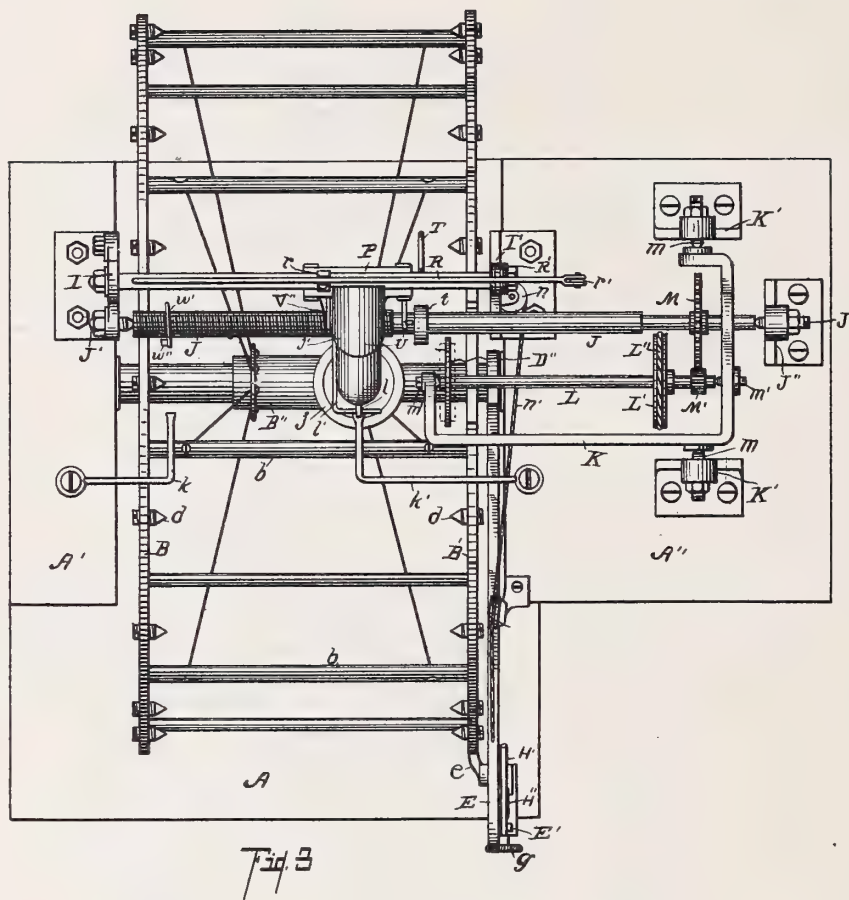
PATENTED MAY 5, 1903.

C. C. SHIGLEY.
PHONOGRAPH.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

4 SHEETS—SHEET 3.



Witnesses:

Erdel A. Teller
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Att'y.

C. C. SHIGLEY.

PHONOGRAPH.

APPLICATION FILED DEC. 8, 1902.

4 SHEETS—SHEET 4.

NO MODEL.

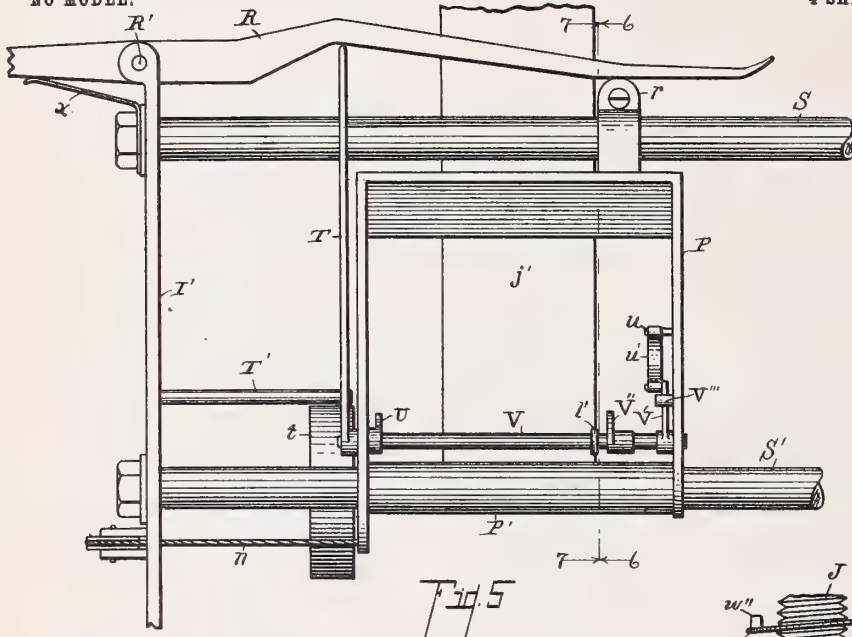


Fig. 5

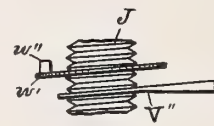


Fig. 9

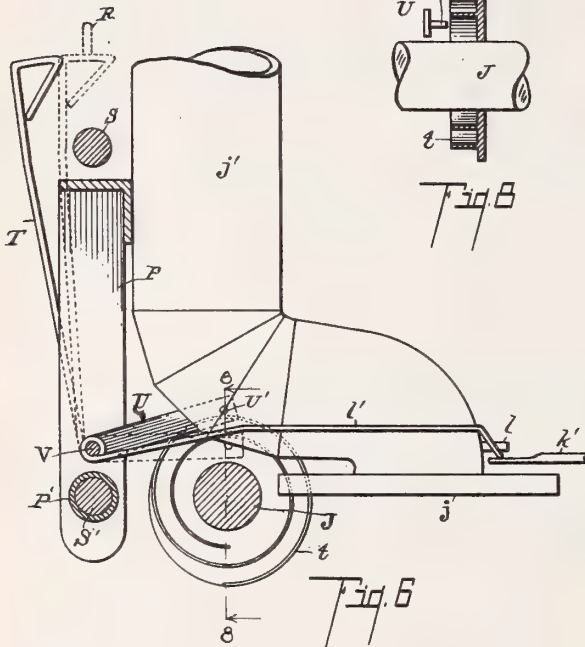


Fig. 6

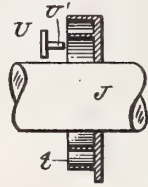


Fig. 8

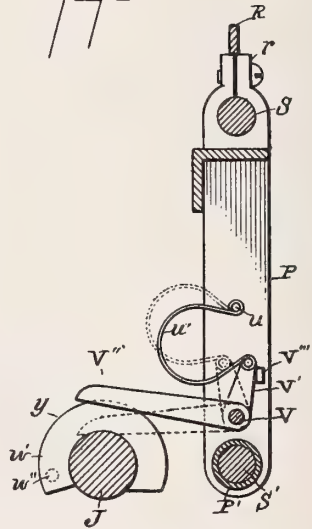


Fig. 7

Witnesses:

Ortel A. Teller

Otis A. Earl

Inventor,

Cyrus C. Shigley

By *Fred L. Chappell*

Att'y.

UNITED STATES PATENT OFFICE.

CYRUS C. SHIGLEY, OF HART, MICHIGAN.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 727,002, dated May 5, 1903.

Application filed December 8, 1902. Serial No. 134,341. (No model.)

To all whom it may concern:

Be it known that I, CYRUS C. SHIGLEY, a citizen of the United States, residing in the village of Hart, in the county of Oceana and State of Michigan, have invented certain new and useful Improvements in Phonographs, of which the following is a specification.

This invention relates to improvements in phonographs.

It relates more particularly to improvements in magazine-phonographs, wherein a number of record-rolls are placed within the machine and are then passed successively or in any desired order to the reproducer mechanism, which, released by a proper means, will reproduce the matter on such record-roll, when the machine will be automatically stopped and adjusted.

The objects of the invention are, first, primarily, to produce a successful magazine-phonograph; second, to provide a construction of phonograph especially adapted for use with a coin-controlled apparatus; third, to provide an improved record-actuating means which can be readily transferred from one record to another; fourth, to provide an improved noiseless driving means for the records of a phonograph; fifth, to provide means of adjusting the mandrel of a phonograph in its relation to the reproducer; sixth, to provide improved means of automatically returning the reproducer mechanism to its initial position; seventh, to provide improved means of controlling the magazine to permit the adjustment of the same for bringing the proper or desired records into place.

Further objects will definitely appear in the detailed description to follow.

I accomplish the objects of my invention by the devices and means described in the following specification.

The invention is clearly defined, and pointed out in the claims.

A structure embodying the features of my invention is fully illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a detail side elevation view, certain parts being broken away, of my improved magazine-phonograph. Fig. 2 is a front elevation view taken from the right-hand side of Fig. 1, certain parts being shown

in section and others broken away to show details of construction. Fig. 3 is a complete plan view of the parts appearing in Figs. 1 and 2, the supporting-mandrels and record-rolls being omitted. Fig. 4 is an enlarged detail sectional view through one of the record-rolls and its supporting-mandrel, taken on line 4 4 of Fig. 1. Fig. 5 is an enlarged detail elevation view of the carriage mechanism for carrying the reproducer, taken from the left-hand side of Fig. 1. Fig. 6 is an enlarged detail sectional view taken on line 6 6 of Fig. 5 looking toward the left. Fig. 7 is a similar enlarged detail sectional view taken on line 7 7 of Fig. 5 looking toward the right. Fig. 8 is a detail sectional view of the trip mechanism for the reproducer, taken on line 8 8 of Fig. 6. Fig. 9 is an enlarged detail perspective view of a part of the screw J, showing the relation of the engaging parts and the release means.

In the drawings the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, the base A of the machine is of any desired form and supports the frames A' A'', which carry the main parts of the machine. Within this frame is supported a wheel having a pair of parallel rims B B' on a suitable hub B'', the hub being provided with suitable antifriction-bearings and supported on an axle h. The rims B B' are connected together by suitable cross-rods. Carried by each rim B B' are inwardly-extending pivoted screws d d, by which the shafts C are supported. On these shafts C are placed the wooden mandrels C', which carry the wax records p. Each shaft C is screw-threaded and engages suitable screw-threads in its respective mandrel C'. A lock-nut C'', preferably winged, is provided for locking the mandrel securely in position at any desired point, thus permitting the ready and secure adjustment of the same, all of which clearly appears in Fig. 4. On each shaft C is a friction-wheel D for the actuation of the mandrels. This wheel D is provided with a soft-rubber tire D', which tire is merely an ordinary rubber elastic band. The exact rela-

tion of this to the other parts of the machine will fully appear as the description proceeds.

The rim B' is provided with notches e' , corresponding to the number of mandrels and in a fixed relation thereto for the purpose of controlling the magazine and delivering the record-rolls one at a time in proper operative relation to the reproducer mechanism. These notches are for the reception of suitable locking-dogs and actuating-pawls, the exact relations and operations of which will better appear from the description later on. From this statement it will be seen that the wheel, which is here illustrated as provided with sixteen record-rolls, can by rotation bring each of said record-rolls in proper operative relation to a phonograph-reproducer, so that they can be reproduced successively or in any order desired.

It is obviously desirable that under the circumstances the reproducer be automatic in its operations with relation to the record-rolls, so that it will only be necessary to start the apparatus to have the record on any roll effectively reproduced and the reproducer automatically adjusted for a succeeding roll. To this end a frame for the carriage for the reproducer is specially provided, consisting of end plates $I I'$, mounted on the frames $A' A''$, respectively. These end plates $I I'$ are connected together by parallel guiding-rods SS' , on which the carriage reciprocates. The carriage P is actuated in one direction by the driving-screw J , which extends outwardly over the frame part A'' and is supported between suitable pivot-screws $J J'$, one of which is in the end plate I and the other of which is in a suitable bracket J'' on the frame A'' .

The reproducer is secured to the carriage and consists of a tube j' and a reproducer part j , pivotally connected to and opening into the tube. The tube j' is the connection for the horn or hearing-tubes.

The reproducer j is pivotally connected to the tube j' , so that it swings readily up and down to accommodate itself to any unevenness of the record-roll. This also permits its being returned to its initial position and then lowered to engage the record-roll. Extending longitudinally of the carriage P is a shaft V , to which is secured an arm V' , that extends outwardly to the front of the reproducer, where it is deflected downwardly and then upwardly at an angle to embrace a pin l on the front end of the reproducer, as clearly appears in Figs. 1, 2, 3, and 6. Lifting-stops are provided to engage the bent rod l' to support the reproducer while the magazine is being adjusted and also to permit of the starting of the mandrels and allow the reproducer to gradually descend upon them. A cord n' is connected to the carriage and also to a weighted part, (described later,) so that the weighted part will, when the carriage is released, return the carriage to the initial position. A blade-like arm V'' is secured to the rock-shaft V and tips with the same and

engages the threads on the screw J , and the revolution of the screw carries the same along like a worm-gear against the resistance of the weight, which weight tends to return the carriage to its initial position. A spring u' is provided, which engages the pivot u on the carriage P and an arm V' on the rock-shaft V and tends to hold the blade-like arm V'' yieldingly against the screw J when the spring is thrown to that side of the dead-center and locks the same securely in the elevated position by throwing the arm V' against the stop V''' whenever its connection is thrown to the opposite side of the dead-center, all of which appears distinctly in Fig. 7. An arm U , with a laterally-projecting pin U' , is also secured to the shaft V of the carriage. An involute worm is provided on the face of a disk t to engage the projecting pin U' of the arm U and gradually draw it toward the shaft J . This acts upon the rock-shaft V , and when the arm V' is swung past the dead-center the spring u' acts quickly and throws the blade V'' into engagement with the screw J , and the screw being in rotation engages the same, and thereby moves the carriage along.

The carrying means is disconnected from the screws by a disk w' on the screw J , having a laterally-projecting pin w'' , as clearly appears in Figs. 7 and 9. This disk being located at the same angle as the screw-threads, the blade-like arm V'' readily passes it and is engaged by the projecting lug or pin w'' , which of course raises it upward, and it is so positioned that it raises the same until the arm V' on the shaft V passes back of the center, when the spring u' automatically throws it back and locks it against the stop. The carriage is thus disengaged from the driving-screw, but is prevented from returning to its initial position by the engagement of the blade V'' with the disk w' . When the shaft V is rocked backwardly, the motor is stopped, as will be described later. With the carriage in this position the magazine-wheel is free and may be revolved to bring any record-roll desired into position to be next reproduced, or upon starting the motor by the introduction of a coin or other desired means the magazine-wheel will be automatically advanced one step to bring the next succeeding record-roll into position to be reproduced. The connections by which this is accomplished will be described later herein.

The disk w' is cut away at one side, so as to allow the blade V'' to pass as the screw is revolved when the motor is again started. As the carriage is thus entirely disengaged, the weighted part promptly returns it to the initial position.

A lever R is pivoted at R' to the plate I' , the spring x urging the short end of the same normally upward. The short end of this lever is connected by a rod r' to the controller of any suitable motor O , preferably located in the frame A'' . The under side of the lever R is cam-shaped. To the shaft V on the car-

riage P is secured an arm T, which extends upwardly into a position to engage the under side of the cam-shaped lever R when the machine is in operation. This lever R normally rests on a stop *r*.

When the carriage returns to its initial position and the engaging blade V'' is thrown into engagement with the screw J, the arm T swings under the lever R, as is indicated by dotted lines in Fig. 6, and, as appears in Figs. 2 and 5, the machine is then in operation, and as the screw moves the carriage along the top part of the lever T presses against the cam of the lever R, actuating the lever and forcing it upward until the blade V'' is finally released by the pin *w''* on the disk *w'*. The arm is then thrown out from under the lever R, and the connection *r'* is thus brought forcibly upward and the motor disengaged, thus stopping the machine, the weighted part returning the carriage to the initial position, as before described.

The motor O, having a pulley O', which is connected by a suitable band L'' to a pulley L' on the shaft L, serves to drive the various parts of the machine. The shaft L is provided with a pinion M', which meshes with a gear M on the screw-shaft J. The frame K is supported on an axis at right angles to that of the shafts J L, the same being suitable screw-pivots *m m* through brackets K' K'.

The shaft L is provided with a thin friction-wheel D'', which is positioned to engage the rubber tires D' on the friction-wheels D of the mandrels. The weight of the frame K holds this driving friction-disk D'' yieldingly downward, so that when the magazine-wheel is revolved the successive mandrels pass under the same, and it readily engages the friction-wheels D on the shafts of said mandrels to drive the same whenever they are brought to the proper position. The pinion M' being of some considerable length and the teeth not engaging very closely permits this freedom of movement, which secures the proper yielding contact to effect the driving of the mandrels.

A suitable support *w* serves as a rest to support the shaft L when the mandrels are moved from under the actuating-disk D'', so that the same will be supported at the proper height for the next mandrel to pass readily under the same.

The magazine-wheel is released and actuated by the movement of the carriage by the following mechanism: A lever E is pivotally supported on the axle *h* of the magazine-wheel and is either made of a sufficient weight to operate the magazine or a weight, as E'', is added thereto. A pawl *e*, held yieldingly against the rim B' by a spring *e''*, is carried by this weighted lever. The cord *n*, connected to the carriage P, is connected to this weighted lever and serves to raise the same when the carriage is moved along in the course of its operation and raises the same sufficiently for the pawl *e* to engage the next as-

cending notch *e'*. A parallel projecting pin E' is on the lever E. A lever G, with a downwardly-projecting finger G'', is supported on a standard F at one side of the wheel, and an adjustable arm H is secured by a suitable set-screw *g* to this lever G and extends upwardly therefrom, and against this arm H rests the pin E', which serves to control the movements of the same when the lever E moves upwardly. A spring *z* on the standard F normally urges the finger part G outwardly toward the position indicated by dotted lines in Fig. 1. A cross-arm F' is pivoted at *f* to an upright F, and a rigid cross-bar F'' is placed beneath it, with a pair of equalizing-springs *f' f'*, which hold the cross-piece F' normally level, although yieldingly in position. On the end of the arm F' toward the wheel are pivoted two pawls *a a'*, the pawl *a* projecting upwardly and adapted to engage the notches *e'* and prevent the downward movement of the magazine-wheel, the pawl *a'* projecting in the opposite direction and tending to prevent the upward movement of the magazine-wheel. These pawls are urged normally into engagement with the wheel by suitable springs *cc'*, respectively. An actuating-wire *a''* extends from the finger or arm G' to the pawl *a* in such relation that when the part G' is moved outward to the dotted position it will pull the pawl *a* over to the dotted position and disengage it from the magazine-wheel. The upper part of the arm or lever H is divided, the part H' being a little separated from it and the main part being deflected outwardly and sufficiently separated from the part H' to permit the free passage of the pin E' between them. A thin elastic spring H'' is secured to the part H' and extends downwardly, projecting over between the part H' and the main part H, the main part H extending beyond the part H', so that when the lever E is raised upwardly the pin E' presses against the lever H and holds it in the position indicated by full lines. This movement allows the lever H, and consequently the part H', to swing momentarily to the point indicated by dotted lines, which pulls the pawl *a* from engagement. The parts are retained in this position until the motor is again started, which releases the carriage. The pin E immediately acts upon the part H and moves it back to the position indicated by full lines, when the pawl *a* will again rest against the rim B' of the magazine-wheel and engage the next notch therein when the wheel has descended sufficiently to bring the next record into operative position. In operation of the lever E the pin E' passes along the spring H'' out to the end of the part H', when the actuation of the spring *z* causes the same to drop to the position indicated by dotted lines, Fig. 1.

I have illustrated and described my machine in its most effective and, I believe, its simplest form. I desire to remark, however, that by carefully adjusting the automatic feed the locking means that I have provided

for the magazine-wheel might be eliminated, though of course it coöperates with the other parts and secures the very best results. I have shown diagrammatically a small motor for actuating the same, which motor might be a check-motor or a spring-motor or any motor means.

I have shown the weighted part for automatically returning the carriage to its initial position. Obviously a spring must be the equivalent, and obviously a weight might be used in place of a spring wherever a spring appears in numerous positions in the apparatus.

While it is a matter of very great convenience to provide adjustable mandrels, such adjustment by taking great care to have the records regularly produced on the rolls might be dispensed with.

It would be useless to enumerate all of the possible variations, and I have mentioned these merely as a suggestion of possible changes that might be made for economy in production.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an upwardly-extending arm V' on said shaft V; a spring *w* secured to said arm V' and to said carriage for automatically locking said rock-shaft V to each side of the dead-center; an arm U having a laterally-projecting pin U' on said shaft V; an involute threaded disk *t* on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk *w* with a laterally-projecting pin *w*'' arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it out of engagement with the shaft J; a cam-lever R; connections from said lever to said motor; an arm T on the shaft V for engaging said cam-lever to actuate the same, whereby said motor is automatically disconnected; a weighted arm or lever E; a pawl mechanism carried by said lever for automatically feeding said magazine-wheel forward; a connecting-cord *n*' from said carriage to said lever E, whereby said carriage is returned to its initial position; a pivotally-supported frame K; a shaft L arranged parallel with the said screw-shaft J supported by said frame; driving connections for said

shaft to said motor; and a friction-wheel D on said shaft for engaging the friction-wheels on the mandrel-shafts, all coacting substantially as described and for the purpose specified.

2. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on said shaft V; an involute threaded disk *t* on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk *w* with a laterally-projecting pin *w*'' arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it out of engagement with the shaft J; a cam-lever R; connections from said lever to said motor; an arm T on said shaft V for engaging said cam-lever to actuate the same, whereby said motor is automatically disconnected; a weighted arm or lever E; a pawl mechanism carried by said lever for automatically feeding said magazine-wheel forward; a connecting-cord *n*' from said carriage to said lever E whereby said carriage is returned to its initial position; a pivotally-supported frame K; a shaft L arranged parallel with the said screw-shaft J supported by said frame; driving connections for said shaft to said motor; and a friction-wheel D on said shaft for engaging the friction-wheels on the mandrel-shafts, all coacting substantially as described and for the purpose specified.

3. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on said shaft V; an involute threaded disk *t* on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk *w* with a laterally-projecting pin *w*'' arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it

out of engagement with the shaft J; connections from said rock-shaft V to said motor, whereby said motor is automatically disconnected when said shaft is rocked rearwardly; 5 a weighted arm or lever E; a pawl mechanism carried by said lever for automatically feeding said magazine-wheel forward; a connecting-cord n' from said carriage to said lever E whereby said carriage is returned to its 10 initial position; a pivotally-supported frame K; a shaft L arranged parallel with the said screw-shaft J supported by said frame; driving connections for said shaft to said motor; and a friction-wheel D on said shaft for en- 15 gaging the friction-wheels on the mandrel-shafts, all coacting substantially as described and for the purpose specified.

4. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying 20 mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with 25 said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on 30 said shaft V; an involute threaded disk t on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its 35 forward position; a disk w with a laterally-projecting pin w'' arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it 40 out of engagement with the shaft J; a cam-lever R; connections from said lever to said motor; an arm T on said shaft V for engaging said cam-lever to actuate the same, whereby said motor is automatically disconnected; 45 means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; connections between said means whereby they are actuated simultaneously; a pivotally-supported frame K; a 50 shaft L arranged parallel with the said screw-shaft J supported by said frame; driving connections for said shaft to said motor; and a friction-wheel D on said shaft for engaging the friction-wheels on the mandrel-shafts, all coacting substantially as described and for the purpose specified.

5. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying 60 said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J 65 with suitable gear connections to said motor for actuating said carriage in one direction;

a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on said shaft V; an involute-threaded disk t on said shaft J adapted to engage said pin U' to 70 rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk w with a laterally-projecting pin w'' arranged at an angle corresponding to the angle of the threads on the 75 screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it out of engagement with the shaft J; connections from said rock-shaft V to said motor, 80 whereby said motor is automatically disconnected when said shaft is rocked rearwardly; means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; connections between said 85 means whereby they are actuated simultaneously; a pivotally-supported frame K; a shaft L arranged parallel with the said screw-shaft J supported by said frame; driving connections 90 for said shaft to said motor; and a friction-wheel D on said shaft for engaging the friction-wheels on the mandrel-shafts, all coacting substantially as described and for the purpose specified.

6. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying 95 mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said 100 carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a 105 laterally-projecting pin U' on the shaft V; an involute-threaded disk t on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when 110 said rock-shaft V is in its forward position; a disk w with a laterally-projecting pin w'' arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to en- 115 gage said arm V'' to throw it out of engagement with the shaft J; a cam-lever R; connections from said lever to said motor; an arm T on said shaft V for engaging said cam-lever to actuate the same, whereby said mo- 120 tor is automatically disconnected; a weighted arm or lever E; a pawl mechanism carried by said lever for automatically feeding said magazine-wheel forward; a connecting-cord n' from said carriage to said lever E whereby 125 said carriage is returned to its initial position; and suitable connections for said mandrels to said motor for driving the same, all coacting substantially as described and for the purpose specified. 130

7. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying

mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on said shaft V; an involute-threaded disk *t* on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk *w* with a laterally-projecting pin *w''* arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it out of engagement with the shaft J; a cam-lever R; connections from said lever to said motor; an arm T on the shaft V for engaging said cam-lever to actuate the same, whereby said motor is automatically disconnected; means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; connections between said means whereby they are actuated simultaneously; and suitable connections for said mandrels to said motor for driving the same, all coacting substantially as described and for the purpose specified.

8. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage P adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage and adapted to contact with said record-rolls; a motor; a screw-shaft J with suitable gear connections to said motor for actuating said carriage in one direction; a rock-shaft V carried by said carriage; an arm U having a laterally-projecting pin U' on said shaft V; an involute-threaded disk *t* on said shaft J adapted to engage said pin U' to rock said shaft V forwardly; a blade-like arm V'' on said rock-shaft V adapted to engage said shaft J when said rock-shaft V is in its forward position; a disk *w* with a laterally-projecting pin *w''* arranged at an angle corresponding to the angle of the threads on the screw-shaft J toward the rear end of the same, adapted to engage said arm V'' to throw it out of engagement with the shaft J; connections from said rock-shaft V to said motor, whereby said motor is automatically disconnected when said shaft is rocked rearwardly; means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; connections between said means whereby they are actuated simultaneously; and suitable connections for said mandrels to said motor for driving the

same, all coacting substantially as described and for the purpose specified.

9. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage adapted to contact with said record-rolls; a motor; a screw-shaft for actuating said carriage in one direction; suitable connections from said shaft to the motor mechanism for driving the same; a rock-shaft carried by said carriage adapted to control said reproducer; a spring secured to said rock-shaft and to said carriage for automatically locking the said rock-shaft to each side of the dead-center; an arm on said rock-shaft carrying a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft, adapted to engage the pin on said arm to rock said shaft forwardly; a blade on said rock-shaft adapted to engage said screw-threaded shaft when said rock-shaft is in its forward position; a disk on said threaded shaft adapted to engage said blade to throw the same out of engagement with said shaft means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; and connections from said motor to said mandrels for driving the same, all coacting for the purpose specified.

10. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage adapted to contact with said record-rolls; a motor; a screw-shaft for actuating said carriage in one direction; suitable connections from said shaft to the motor mechanism for driving the same; a rock-shaft carried by said carriage adapted to control said reproducer; an arm on said rock-shaft carrying a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft, adapted to engage the pin on said arm to rock said shaft forwardly; a blade on said rock-shaft adapted to engage said screw-threaded shaft when said rock-shaft is in its forward position; a disk on said threaded shaft adapted to engage said blade to throw the same out of engagement with said shaft; means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; and connections from said motor to said mandrels for driving the same, all coacting for the purpose specified.

11. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels and record-rolls; friction-wheels on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said

carriage adapted to contact with said record-rolls; a motor; a screw-shaft for actuating said carriage in one direction; suitable connections from said shaft to the motor mechanism for driving the same; a rock-shaft carried by said carriage adapted to control said reproducer; an arm on said rock-shaft carrying a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft, adapted to engage the pin on said arm to rock said shaft forwardly; a blade on said rock-shaft adapted to engage said screw-threaded shaft when said rock-shaft is in its forward position; a disk on said threaded shaft adapted to engage said blade to throw the same out of engagement with said shaft; connections from said rock-shaft to said motor whereby said motor is disconnected when said shaft is rocked rearwardly; means for returning said carriage to its initial position; means for feeding said magazine-wheel forward; and connections from said motor to said mandrels for driving the same, all coacting for the purpose specified.

12. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the said record-roll; a screw-threaded shaft; means for driving the said shaft; a spring secured to said rock-shaft and to said carriage for automatically locking the same at each side of the dead-center; an arm on said rock-shaft having a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft adapted to engage said pin to throw said shaft forwardly; a blade-like arm on said rock-shaft adapted to engage said threaded shaft when said rock-shaft is in its forward position; a disk with a laterally-projecting pin thereon, arranged at an angle to correspond with the angle of the threads on said screw-shaft toward the rear of the same, adapted to engage said blade to throw it out of engagement with the shaft; and means for automatically returning the said carriage to its initial position, all coacting for the purpose specified.

13. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the said record-roll; a screw-threaded shaft; means for driving said shaft; an arm on said rock-shaft having a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft adapted to engage said pin to throw said shaft forwardly; a blade-like arm on said rock-shaft adapted to en-

gage said threaded shaft when said rock-shaft is in its forward position; a disk with a laterally-projecting pin thereon arranged at an angle to correspond with the angle of the threads on said screw-shaft; toward the rear of the same, adapted to engage said blade to throw it out of engagement with the shaft; and means for automatically returning the said carriage to its initial position, all coacting for the purpose specified.

14. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the said record-roll; a screw-threaded shaft means for driving the said shaft; a spring secured to said rock-shaft and to said carriage for automatically locking the same at each side of the dead-center; an arm on said rock-shaft having a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft adapted to engage said pin to throw said shaft forwardly; a blade-like arm on said rock-shaft adapted to engage said threaded shaft when said shaft is in its forward position; a disk with a laterally-projecting pin thereon arranged on said screw-shaft toward the rear of the same, adapted to engage said blade to throw it out of engagement with the shaft; and means for automatically returning the said carriage to its initial position, all coacting for the purpose specified.

15. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the said record-roll; a screw-threaded shaft; means for driving the said shaft; an arm on said rock-shaft having a laterally-projecting pin; an involute-threaded disk on said screw-threaded shaft adapted to engage said pin to throw said shaft forwardly; a blade-like arm on said rock-shaft adapted to engage said threaded shaft when said rock-shaft is in its forward position; a disk with a laterally-projecting pin thereon arranged on said screw-shaft toward the rear of the same, adapted to engage said blade to throw it out of engagement with the shaft; and means for automatically returning the said carriage to its initial position, all coacting for the purpose specified.

16. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with

said record-roll; a screw-threaded shaft; means for driving said shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded shaft when said rock-shaft is in its forward position; a disk with a laterally-projecting pin thereon, arranged on said screw-threaded shaft at an angle to correspond with the angle of the threads adapted to engage said blade to throw it out of engagement with said shaft and to disengage said reproducer from the record-roll, for the purpose specified.

17. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with said record-roll; a screw-threaded shaft; means for driving said shaft; a blade-like arm on said rock-shaft adapted to engage said screw-threaded shaft when said rock-shaft is in its forward position; a disk with a laterally-projecting pin thereon adapted to engage said blade to throw it out of engagement with said shaft and to disengage said reproducer from the record-roll, for the purpose specified.

18. In a phonograph, the combination of a record-roll; means for revolving the same; a carriage adapted to reciprocate parallel therewith; a phonograph-reproducer pivotally supported on said carriage; a rock-shaft adapted to raise and lower said reproducer to throw the same into and out of engagement with the record-roll; a shaft; means for driving the same; an arm on said rock-shaft having a laterally-projecting pin; an involute-threaded disk on said shaft adapted to engage said pin to throw said rock-shaft forwardly to bring said reproducer into engagement with said record-roll, for the purpose specified.

19. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; means for driving said carriage; means for automatically releasing said carriage at the end of its movement; a weighted lever E; connections from said weighted lever to said carriage; notches e' in the periphery of said magazine-wheel; a pawl on said lever adapted to engage notches; a pivotally-supported lever G with a downwardly-extending finger G' thereon; a pivoted bar F' ; springs for holding said bar yieldingly in position; pawls a a' carried by said bar adapted to engage said notches in said magazine-wheel; connections from said downwardly-extending finger G' to said pawl a ; an upwardly-extending arm H adjustably secured to said lever G, adapted to contact

with said weighted lever E whereby it is operated to release said pawl a , all coacting for the purpose specified.

20. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; means for driving said carriage; means for automatically releasing said carriage at the end of its movement; a lever E; connections from said lever to said carriage whereby said carriage is returned to its initial position; connections from said lever to said magazine-wheel whereby the same is advanced; an escapement mechanism for said magazine-wheel; and connections from said lever to said escapement mechanism whereby the same is operated, all coacting for the purpose specified.

21. In a magazine-phonograph, the combination of a frame; a magazine-wheel carrying mandrels; record-rolls on said mandrels; a carriage adapted to reciprocate parallel with said record-rolls; a phonograph-reproducer pivotally supported on said carriage; means for driving said carriage; means for automatically releasing said carriage at the end of its movement; a lever E; connections from said lever to said carriage whereby said carriage is returned to its initial position; connections from said lever to said magazine-wheel whereby the same is advanced, for the purpose specified.

22. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts; means for adjustably securing said shafts in said wheel; wheels D on said shafts having rubber tires D' thereon; a pivotally-mounted frame K; a shaft L carried by said frame; a thin friction-wheel on said shaft for engaging the friction-wheels D of the mandrel-shaft; means for driving said shaft L; and means for controlling said magazine-wheel, coacting as specified.

23. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts; means for adjustably securing said shafts in said wheel; wheels D on said shafts having rubber tires D' thereon; a pivotally-mounted frame K; a shaft L carried by said frame; a friction-wheel on said shaft for engaging the friction-wheels D of the mandrel-shaft; means for driving said shaft L; and means for controlling said magazine-wheel, coacting as specified.

24. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts carried thereby; wheels D on said shafts having rubber tires D' thereon; a pivotally-mounted frame K; a shaft L carried by said frame; a thin friction-wheel on said shaft for engaging the friction-wheels D of the mandrel-shafts; means for driving said shaft L;

and means for controlling said magazine-wheel, coacting as specified.

25. In a magazine-phonograph, the combination of a frame; a magazine-wheel; mandrel-shafts carried thereby; wheels D on said shafts having rubber tires D' thereon; a pivotally-mounted frame K; a shaft L carried by said frame; a friction-wheel on said shaft for engaging the friction-wheels D of the man-

drel-shafts; means for driving said shaft L; and means for controlling said magazine-wheel, coacting as specified. 10

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

CYRUS C. SHIGLEY. [L. s.]

Witnesses:

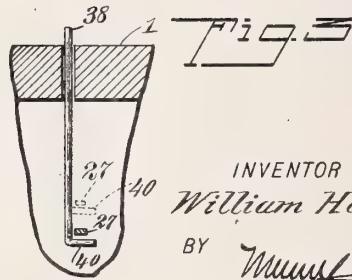
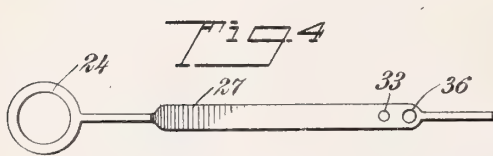
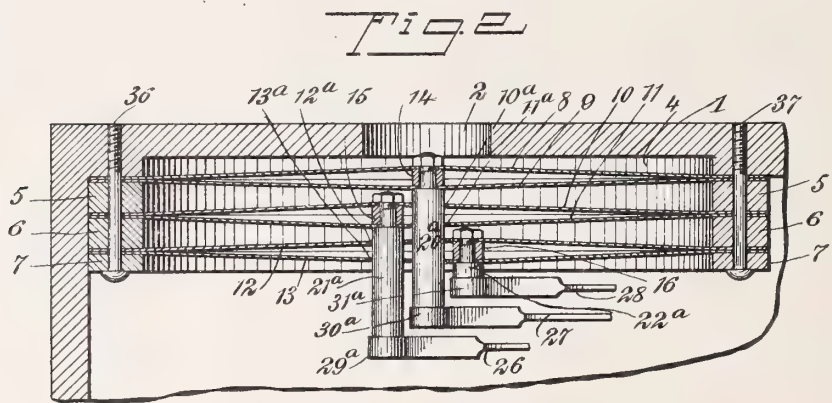
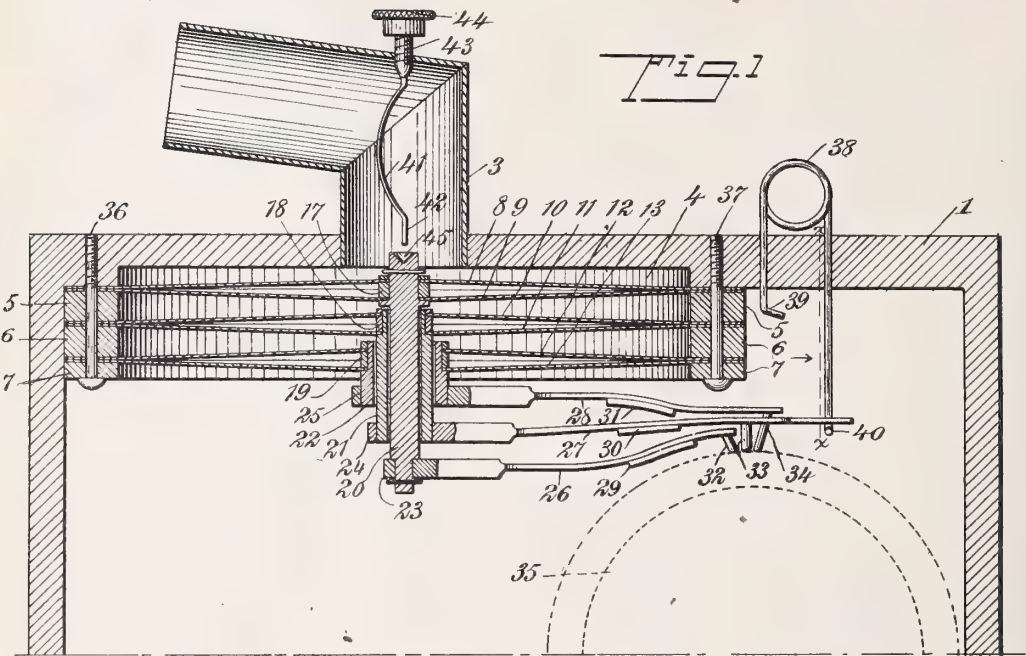
VENUS HANDY,

STEPHEN A. SHUFELT.



W. HART.
GRAPHOPHONE REPRODUCER.
APPLICATION FILED AUG. 7, 1902.

NO MODEL.



WITNESSES:
J. S. Proply
Walton Harrison

INVENTOR
William Hart
BY *Mumford*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

WILLIAM HART, OF KIRKSVILLE, MISSOURI.

GRAPHOPHONE-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 727,357, dated May 5, 1903.

Application filed August 7, 1902. Serial No. 118,762. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HART, a citizen of the United States, and a resident of Kirksville, in the county of Adair and State of Missouri, have invented new and useful Improvements in Graphophone-Reproducers, of which the following is a full, clear, and exact description.

My invention relates to graphophones, my object more particularly being to improve the sounds made by the reproducer and also to provide certain adjustments for regulating the sounds reproduced.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a vertical section through my reproducer. Fig. 2 is a somewhat similar view showing certain modifications of minor parts. Fig. 3 is a fragmentary section upon the line *xx* of Fig. 1, showing one of the adjustments; and Fig. 4 is a plan view of one of the levers connected with a diaphragm and provided with a reproducing-point.

The frame 1 is provided with a sound-aperture 2, in which is fitted the tube 3, upon which the usual trumpet may be mounted. Mounted adjacent to the sound-aperture 2 and concentric therewith is a circular sink 4, as shown more particularly in Figs. 1 and 2. Annular rings or washers 5 6 7 are provided for the purpose of holding the several diaphragms. Each diaphragm consists of a pair of disk-like members 8 9 10 11 12 13, made of resilient material and spaced asunder by means of the annular washers 14 15 16 of the form shown in Fig. 2 and 17 18 19 of the form shown in Fig. 1. The upper diaphragm shown in Fig. 1 is connected with a central depending stem 20. The middle and lower diaphragms shown in said figure are connected, respectively, with the depending sleeves 21 and 22. The stem 20 and sleeves 21 and 22 are, by means of enlarged heads 23 24 25, connected with the respective levers 26 27 28. Somewhat similarly, as indicated in Fig. 2, the three diaphragms may be provided with depending stems 20^a 21^a 22^a, which are rigidly connected, by means of the annular fastenings 29^a 30^a 31^a, with the levers 26 27 28.

In the modification shown in Fig. 2 the

disks 10 11 12 13 are provided with apertures 10^a, 11^a, 12^a, and 13^a, through which the stems 20^a 21^a pass loosely, so as not to interfere with the vibration of any part. The levers 26 27 28 are provided with weights 29 30 31 and with reproducing-points 32 33 34, as indicated in Fig. 1. The record 35, from which the reproduction is to be made, is indicated by dotted lines in Fig. 1. The diaphragms and annular rings or washers supporting the same are clamped together and held rigidly in position by means of screws 36 37 and others not shown.

A mute stop, consisting of a section of spring metal 38, bent into the form shown and having hooks 39 40, is provided for the purpose of raising the levers 27 28 in succession. Another mute stop, consisting of a bow 41, provided with a point 42 and secured upon a screw 43, provided with a milled head 44, is mounted upon the tube 3. By turning the milled head 44 the point 42 is brought into engagement with the countersink 45 in the stem 20, thereby lessening the amplitude of the vibrations of the upper diaphragm, consisting of the disks 8 9.

The operation of my device is as follows: The record being placed in position and actuated in the usual manner, the reproducing-points 32 33 34, which are made of sapphire set in sockets and radially inclined, as indicated in Fig. 1, are caused to follow the grooves or track of the record, and thereby cause the diaphragms to vibrate. The weights 29 30 31 are very light, and they only serve to effect greater solidity of movement in the levers and prints. It is not desirable to have these weights heavy, for the reason that their inertia could not be overcome with sufficient rapidity. I have found, however, that if the weights be properly proportioned they greatly improve the quality and loudness of the sounds produced. As the points 32 33 34 are very close together, they act upon substantially the same part of the record, and the sounds produced from the several diaphragms consist substantially, but not exactly, of duplicates. By raising the mute stop 38 the hook 40 raises the lever 27, thereby disengaging the point 33 from the record. Raising the mute stop 38 still higher, the lever 27 in turn raises the lever 28, so that only the

point 32 is in contact with the record. When this is the case, the lower end of the mute stop 38 and the hook 40 occupy the positions indicated by dotted lines in Fig. 3. It will be readily seen, therefore, that by means of the mute stop 38 one, two, or three of the reproducing-points may be maintained in engagement with the record, so that the sounds reproduced shall be the vibration of one, two, or three double diaphragms.

By adjusting the milled head 44 shown at the top of Fig. 1 only the upper double diaphragm is affected. Owing to the elasticity of the bow 41, the upper diaphragm can be partially restricted in its movement. In other words, the sound of the upper diaphragm may be deadened to any desired degree.

I find that the sounds produced with the machine above described are much louder, clearer, and richer than with the ordinary reproducer. The double diaphragms are more effective than single diaphragms. The points are maintained in engagement with the record by the elasticity of the diaphragms. By arranging the diaphragms as above described each pair of disks serves as an elastic fastening or spring for normally maintaining one of the levers in its predetermined position, each double diaphragm thereby coacting with one of the weights 29 30 31 for the purpose of maintaining one of the points 32 33 34 in proper resilient contact with the record.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A graphophone-reproducer, comprising a sound-box, a plurality of diaphragms in the said box, a plurality of points tracking substantially upon the same record of sound, and means for connecting one of said points with each of the said diaphragms.

2. A graphophone-reproducer, comprising a sound-box, a plurality of composite diaphragms built up of pairs of disk-like members connected together at their edges and spaced asunder at their centers, and a lever connected with each of said diaphragms and provided with a reproducing-point for engaging a record, said points tracking substantially upon the same record of sound.

3. A graphophone-reproducer, comprising a sound-box, a plurality of diaphragms mounted therein, a plurality of distinct members, each connected with a diaphragm and provided with a reproducing-point for normally engaging a record, and means successively disengaging said points from said record for the purpose of affecting sounds reproduced.

4. A graphophone-reproducer, comprising a sound-box, a plurality of diaphragms mounted therein, levers, one connected with each of said diaphragms and provided with a reproducing-point for engaging a record, said points tracking substantially upon the same record of sound, and weights mounted upon said levers for effecting greater solidity of movement thereof.

5. A graphophone-reproducer, comprising a sound-box, a plurality of diaphragms mounted therein, a plurality of reproducing-points disposed closely together for engaging a record, said points tracking substantially upon the same record of sound, and means for connecting each diaphragm with a reproducing-point, the arrangement being such that a single record may simultaneously actuate all of said diaphragms, thereby multiplying and blending together a number of distinct reproductions.

6. A graphophone-reproducer, comprising a sound-box, diaphragms mounted therein, reproducing-points for engaging a record, means for connecting each diaphragm with a reproducing-point, and mute stops for governing the sound reproduced.

7. A graphophone-reproducer, comprising a sound-box, a composite diaphragm built up of distinct pairs of disk-like members of resilient material connected together at their edges and spaced asunder at their centers, and members, each connected with a diaphragm and provided with a reproducing-point for engaging a record, said points tracking substantially upon the same record of sound, the arrangement being such that the elasticity of said diaphragms maintains said reproducing-points in engagement with said record.

8. In a graphophone-reproducer, the combination with a sound-box, a plurality of diaphragms in said box, and a plurality of levers, one connected with each of the diaphragms, and each provided with a point, of a mute stop for engaging one of the levers to raise the same.

9. In a graphophone-reproducer, the combination with a sound-box, and a plurality of diaphragms in the box, of a plurality of levers, each provided with a point, one of said levers being apertured to receive the point of an adjacent lever, means for connecting each lever with a diaphragm, and a mute stop for engaging the apertured lever to raise the same.

10. In a graphophone-reproducer, the combination of a sound-box, a plurality of diaphragms in the box, a plurality of points, means for connecting one of said points with each of the said diaphragms, and a mute stop for reducing the vibrations of one of the said diaphragms.

11. In a graphophone-reproducer, the combination of a sound-box, a plurality of diaphragms in the box, a plurality of points, means for connecting one of said points with each of the diaphragms, a mute stop for reducing the vibrations of one of the diaphragms, and a mute stop for raising the points connected with the other two diaphragms.

12. In a graphophone-reproducer, the combination with a sound-box, of a plurality of diaphragms in the box, a stem connected with the upper diaphragm, a sleeve on the stem and with which the next diaphragm is con-

nected, a second sleeve on the first sleeve and with which the third diaphragm is connected, levers carried by the stem and sleeves and each provided with a point, and an adjustable mute stop for engaging the end of
5 said stem.

In testimony whereof I have signed my

name to this specification in the presence of two subscribing witnesses.

WILLIAM HART.

Witnesses:

GEO. D. SCOTT,
LEE HORKINS.

727, 899

F. L. CAPPS.
REPRODUCER FOR GRAPHOPHONES.
APPLICATION FILED MAR. 10, 1903.

NO MODEL.

Fig.1

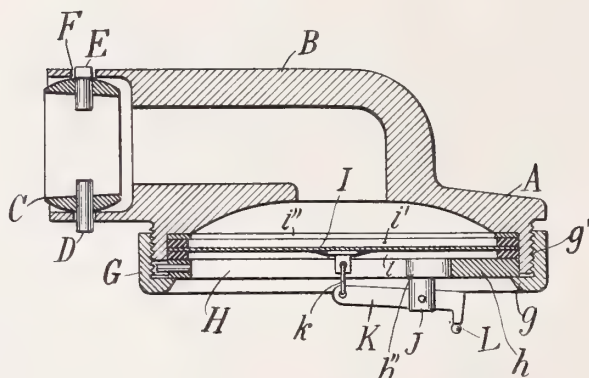
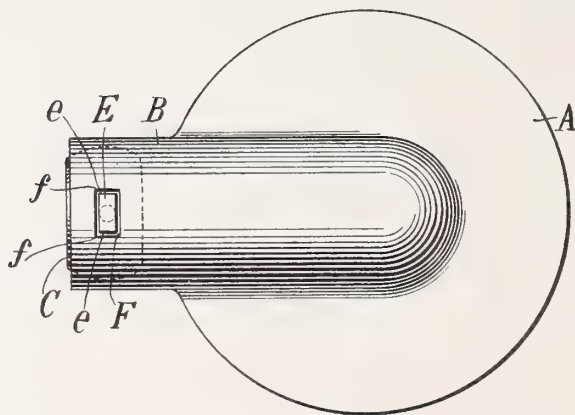


Fig.2



Witnesses:

Raphaël Ketter
Wm. B. Markham

Frank L. Capps, Inventor
Marco, Cameron Lewis, Att'y

by

UNITED STATES PATENT OFFICE.

FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

REPRODUCER FOR GRAPHOPHONES.

SPECIFICATION forming part of Letters Patent No. 727,899, dated May 12, 1903.

Application filed March 10, 1903. Serial No. 147,193. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. CAPPS, of Bridgeport, Connecticut, have invented a new and useful Reproducer for Graphophones, which is fully set forth in the following specification.

This invention relates to reproducers for graphophones; and its object is to prevent the accidental displacement of the stylus from the record-groove.

The invention consists in the novel manner of mounting the "speaker" upon the connecting-link that is removably secured upon the carriage of the machine; further, in certain improvements in securing the diaphragm in place and the mounting of the stylus-arm and in other details hereinafter to be pointed out.

Reproducers for graphophones which operate with the ordinary cylindrical sound-record are mounted in such a manner as to have a slight lateral play with regard to the groove of the sound-record. This is generally accomplished by the employment of a "trunnion-bearing," which constitutes the connection between the speaker or "head" and the carriage of the machine. The head is connected to this intermediate bearing by (approximately) vertical pivoting, so that the reproducer is free to swing laterally and adjust itself to the record-groove. It frequently happens, however, that the head is liable to swing to one side or the other when such movement is not desired, which is spoken of as the "speaker falling away" from the record. When such falling away occurs, the machine either skips a portion of the record or repeats a portion already reproduced, depending, of course, upon the direction in which the head has fallen away. One of the objects of my present invention is to avoid this defect.

The invention may best be understood by reference to the accompanying drawings.

Figure 1 is a longitudinal section. Fig. 2 is a top view.

In the drawings, A represents the head or speaker, having the usual neck B.

C represents the trunnion-bearing, which is adapted for the usual engagement upon

the carriage of the graphophone. In the usual construction the speaker is pivoted to the trunnion-bearing C by a round pin or journal, and when in position its weight would be supported on these two pivots, and it is free to swing and with the slightest jar will swing to one side or the other of its correct position in the vertical plane through its axis.

According to my present invention instead of employing the round journal-pivot, as heretofore, I make use of one round (lower) pivot or journal D and opposite thereto another bearing device E. This latter consists in the form shown of a flattened lug entering an enlarged and flattened slot F in the neck of the speaker. When the speaker is in its normal position, there is an extended bearing-surface. The weight of the speaker is supported at the two meeting surfaces *e e* and *f f*, which constitute an extended bearing and tend to hold the speaker level. Since the slot F is larger than the stud E, the speaker as a whole can, as heretofore, be readily swung to either side by the abnormal deviations of the sound-record; but any jar given the speaker (as by the ordinary running of the graphophone) instead of throwing the speaker to one side would, on the contrary, restore it to its normal position if it were already out of alinement.

Of course it is not necessary that the stud E and the slot F be parallelograms, as shown in the drawings, so long as there is provided an extended bearing-surface consisting of at least two bearing edges, such as *e* and *e*, *f* and *f*. Moreover, instead of the two separate bearings D and E there may be a continuous pin rounded at one bearing and flattened (or its equivalent) at the other bearing.

To describe the next feature of my improved reproducer, G represents a ring having an inturned flange *g* and screw-threaded at *g'* to engage with corresponding screw-threads on the head A. H is an annulus provided with the web *h* and the tongue *h''*. The diaphragm I is located on the inner side of the annulus, preferably there being an intervening rubber gasket *i* between the diaphragm and annulus. A second rubber gas-

ket *i'* lies against the rear of the diaphragm, and preferably a metal gasket *i''* is placed adjacent to the rubber gasket *i'*. This metal gasket serves as a bearing-surface when the head A is screwed into the ring G to prevent tearing the rubber gasket *i'*. Upon the tongue *h''* is supported the slotted post J, in which is pivoted lever K, preferably so as to provide arms of unequal length, as shown. The inner and longer arm is connected, as by an intermediate link *k*, to the center of the diaphragm I, while the outer and shorter arm is hollowed out to receive the reproducing ball or stylus L.

When the speaker is in operative position, that portion of its weight which is not borne on the supports D and E rests upon the stylus L. This pressure on the shorter arm of the lever K tends to pull the longer arm of the lever out (away from the diaphragm) and tautens the connections *k* and holds the diaphragm under tension, the latter becoming convexed outwardly and ready to respond most sensitively to the slightest irregularities of the sound-record.

By reason of the weight of the forward end of the device resting upon stylus L at one end of the lever any accidental upward impulse given the lever by the record-cylinder (owing to an abnormally abrupt contour in the bottom of the record-groove or for other cause) will not cause the speaker to be jerked up clear of intimate contact of its stylus with the bottom of the groove; but the impulse will be expended in pulling down on the other end of lever K against the diaphragm, so that this feature of my invention insures that the stylus will continue to track in the proper record-groove.

By means of my invention as a whole I obtain a reproducer which will faithfully and continuously keep track in its record-groove, is not liable (as heretofore) to jump out, is not liable (also as heretofore) to fall away laterally from its groove, and if for any cause it is set awry will at once adjust itself properly. Moreover, the various parts are simple and inexpensive, they can be readily replaced when broken, and the substitution or assemblage is easily accomplished.

I do not confine myself to the precise construction or arrangement of parts, which I have described specifically merely for the purpose of illustration. Furthermore, portions of my invention may be used to the exclusion

of other portions without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In a talking-machine, a reproducer, a neck or tubing for detachable connection with the carriage, and means for securing said reproducer to said tubing, the said means consisting of a journal-bearing on one side of said tubing and diametrically opposite thereto a flattened stud engaging a flattened slot.

2. The combination of a reproducer for talking-machines, and a trunnion-bearing secured thereto by a flattened stud on one of the parts entering a flattened slot in the other.

3. The combination with a talking-machine reproducer and a trunnion-bearing therefor, of a connection between the same which provides a plurality of bearing-surfaces in approximately the same horizontal plane.

4. The combination of a reproducer, a trunnion-bearing therefor, and a substantially vertical pivot between the two permitting lateral play of the former, there being between said pivot and the movable part a plurality of bearing-surfaces within the same horizontal plane.

5. The combination of a reproducer-head, a diaphragm therein, an annulus beyond said diaphragm, and a stylus-lever pivoted upon a tongue extending radially inwardly from said annulus, its inner end connected with the center of said diaphragm.

6. The combination of a reproducer-head, a ring with inturned flange secured thereto, an annulus and a diaphragm with gaskets held between said head and said flange, a post supported upon an inward projection from said annulus, and a stylus-lever pivoted on said post and having its inner end connected to said diaphragm.

7. The combination of a reproducer-head, a trunnion-bearing therefor, a flattened pivot between the two, a post supported in front of the diaphragm of said head and inwardly from the periphery thereof, and a lever pivoted upon said post and connected at its inner end to said diaphragm and carrying a stylus at its outer end.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

FRANK L. CAPPS.

Witnesses:

C. A. L. MASSIE,
R. L. SCOTT.

727.921

No. 727,921.

PATENTED MAY 12, 1903.

V. H. EMERSON & F. L. CAPPS.
AUTOMATIC SOUND RECORDER.
APPLICATION FILED OCT. 14, 1902.

NO MODEL.

Fig.1

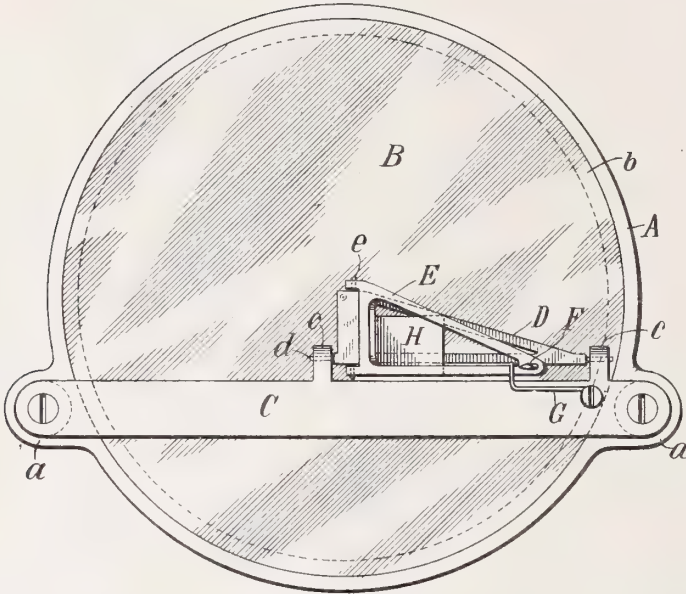


Fig.2

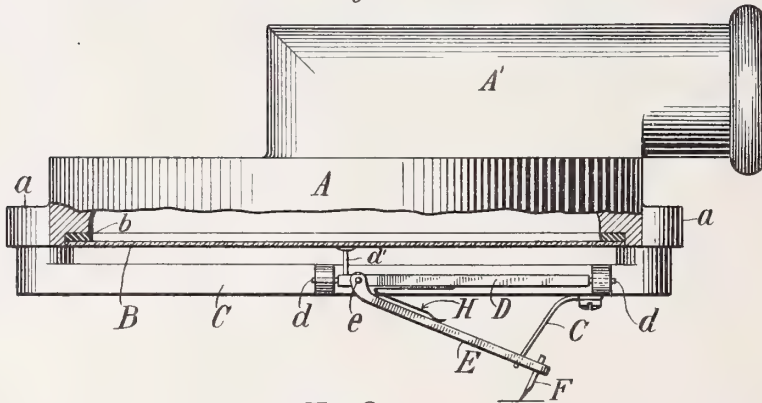
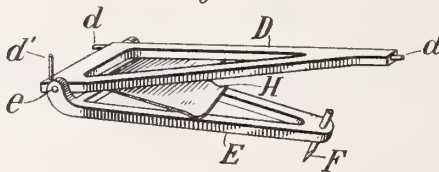


Fig.3



Witnesses:

W. H. Emerson
W. B. Herkman

Victor H. Emerson { Inventors
and Frank L. Capps

by *Philip Kaurio* Atty

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, AND FRANK L. CAPPS, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO AMERICAN GRAPHOPHONE COMPANY, A CORPORATION OF WEST VIRGINIA.

AUTOMATIC SOUND-RECORDER.

SPECIFICATION forming part of Letters Patent No. 727,921, dated May 12, 1903.

Application filed October 14, 1902. Serial No. 127,298. (No model.)

To all whom it may concern:

Be it known that we, VICTOR H. EMERSON, of Newark, New Jersey, and FRANK L. CAPPS, of Bridgeport, Connecticut, have invented a new and useful Automatic Sound-Recorder, which is fully set forth in the following specification.

Our invention relates to sound-recorders for producing original engraved sound-records of the so-called "zigzag" type, in which operation an original record is first made in a flat tablet or disk of comparatively soft material, from which is obtained an electroplate matrix that is impressed into a disk of suitable plastic material. Heretofore in producing sound-records by this particular system the recorder has commonly been held rigid (but adjustable to and from its recording-disk) with its lower face and diaphragm parallel to the upper surface of the recording-tablet. The surface of the latter is almost sure to become uneven after standing awhile, so that in the arrangement just described it has been found necessary to pare or turn the face of the disk to a true surface immediately before making a record. This of course occupies some little time and calls for expert attention. Another scheme that has been used to some extent involves the employment of a so-called "determining" device, a shoe or runner attached to the recorder-head and traveling upon the surface of the record-disk to prevent the needle sinking too far into the material and also serving to adjust the recorder automatically to inequalities in the surface of the tablet. In making such records the softer the material the better the results, (because the original record is not used for reproduction, and it offers less resistance to the free vibrations of the recording-tool;) but the shoe or runner cannot be employed upon a soft material without clogging and defacing the surface of the disk.

The object of our present invention is to produce a recorder that will adjust itself automatically to chance inequalities in the surface of the recording material without the employment of the shoe referred to, whereby we dispense with the preliminary paring

50 aforesaid. By our construction we produce a recorder for this kind of work that in the directions of its movement for registering a record in the material will be responsive only to the vibrations of its diaphragm though highly responsive to these, while it will yield readily in other directions to accommodate itself to chance inequalities or irregularities.

Our invention then may be called an "automatic" recorder; and it consists in the construction and arrangement and combination 60 of parts to be pointed out.

In the drawings, Figure 1 is a face view, and Fig. 2 a side view, of our automatic recorder, partly broken away; and Fig. 3 is a detail of the connecting devices between the 65 diaphragm and the stylus.

A represents the head of the recording device, and A' the hollow tube that communicates with the open space behind the (glass) diaphragm B. By preference this diaphragm 70 is rather large—say about two inches in diameter—and is secured to the head by a rubber ring *b*, cemented between the two.

C represents a bridge across one side of the diaphragm, secured in any convenient manner, as by projections *a a* from the head A. The central portion of bridge C is cut away or elevated above the surface of the diaphragm, so as not to interfere with the vibrations of the latter. Two lugs *c c* extend from 80 bridge C toward the central portion of the diaphragm, and between these lugs is journaled the connecting device which carries the recording-stylus.

A convenient form of the connecting device 85 is illustrated in Fig. 3. The triangular or A-shaped piece D is journaled between the lugs *c c*, as by a pin *d*, extending the whole length thereof. The outer corner of piece D lies above the center of the diaphragm and is connected thereto by the wire *d'*. The member E, likewise A-shaped, is pivoted transversely across the larger end of member D, as by pin *e*, extending therethrough, as shown. At the 90 outer end of piece E is secured the recording tool or stylus F. The hook G from bridge C limits the outward play of member E, while a flat spring H holds member E and its stylus 95

F normally at the extreme position away from the diaphragm.

The vibrations of the diaphragm to and fro or parallel to its axis are transmitted (through the journal *d*) into lateral vibrations at the end of stylus F. The extended bearings afforded by the lug *c c* and the pin *d* prevent any lateral twist or lost motion. The stylus will thus have no lateral motion except that imparted to it from the diaphragm. In case an uneven surface be presented at any portion of the recording-disk the yielding of the spring H will permit the member E (with stylus F) to ride up over such chance irregularities, the spring H at once returning the stylus, or rather retaining it in proper operative relation to the recording material. The extended bearings furnished by the larger ends of members D and E and the pin *e* prevent any sidewise motion of member E (and the stylus) relative to member D, so that, as already stated, the stylus F will move sidewise only in response to vibrations of the diaphragm. The devices D and E normally operate as an integral or unitary piece, transmitting the vibrations from wire *d'* to stylus F, the sound-vibrations thus transmitted not being sufficient to overcome the inertia or stiffness of spring H, and the latter is called into play only by unevennesses in the surface of the tablet.

Of course our invention is not limited to the precise construction of parts or the exact arrangement of parts described, which have been given for the purposes of illustration. It may also be employed in making sound-records of other types than that particularly described.

Having thus described our invention, we claim—

1. In a recording apparatus of the type

specified the combination with the head and its diaphragm, of the bridge across the same, the connecting member secured to the center of the diaphragm and journaled upon said bridge, the second connecting member pivoted transversely upon the first-named member and carrying the stylus, and the spring normally holding the second member away from the diaphragm.

2. In an apparatus for engraving zigzag sound-records of uniform depth, a head carrying a diaphragm, a bridge across said diaphragm, a device journaled in said bridge and connected rigidly to said diaphragm, and a second device yieldingly pivoted to the first-named device and itself carrying the recording-stylus.

3. In a sound-recording apparatus, the combination of the stylus and the member to which it is secured, a second member mounted yieldingly upon the same, and pivoted transversely thereof to a fixed support carried by the recorder-head and secured rigidly to the center of the diaphragm.

4. A sound-recorder, comprising the combination with a sound-box and its diaphragm, of a triangular member pivoted along one side to said sound-box and connected at its outer end to said diaphragm, a second member pivoted to said first-mentioned member transversely to the pivot of the former and carrying the recording-tool at its free end.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.
FRANK L. CAPPS.

Witnesses:

C. A. L. MASSIE,
WILLIAM E. HILLS.

727,960.

No. 727,960.

PATENTED MAY 12, 1903.

J. W. JONES.
SOUND RECORDING TABLET.
APPLICATION FILED MAR. 27, 1900.

NO MODEL.

Fig. 1.



Fig. 2.

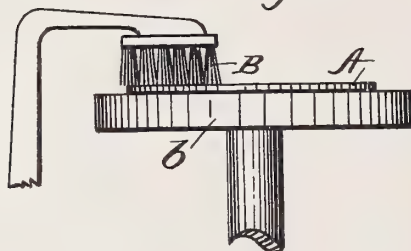


Fig. 3.

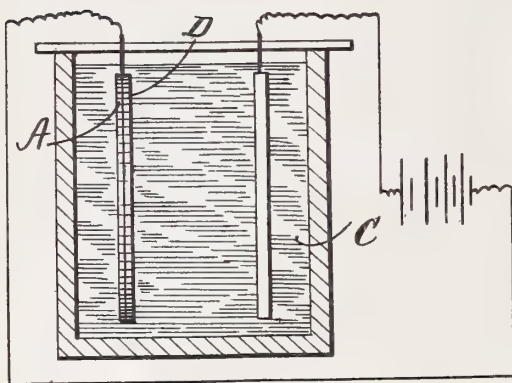


Fig. 5.

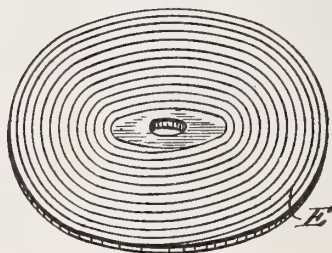
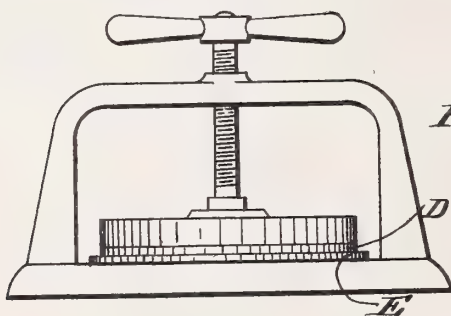


Fig. 4.



Witnesses.

W. R. Edelin.

W. B. L. Frank.

Inventor

Joseph W. Jones
by Philip H. Howard
his attorney

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

SOUND-RECORDING TABLET.

SPECIFICATION forming part of Letters Patent No. 727,960, dated May 12, 1903.

Application filed March 27, 1900. Serial No. 10,367. (No specimens.)

To all whom it may concern.

Be it known that I, JOSEPH W. JONES, of the city and State of New York, have invented new and useful Improvements in Sound-Recording Tablets, which are fully set forth in the following specification.

Sound-records of the type characterized by vertical irregularities corresponding to sound-waves (commonly known as "graphophone" or "phonograph" records) are engraved in a wax-like material and may be employed directly for purposes of reproduction. Copies or duplicates are obtained from such originals by the well-known mechanical process of duplicating by means of a "duplicating-machine." These duplicates also are engraved, and the material in which they are formed is no harder or more durable than the original recording material. The making of each such duplicate defaces the original more or less, so that the duplicates get poorer and poorer, while the original is soon worn down. On the other hand, sound-records characterized by lateral undulations (the type being commonly known as "gramophone-records") are produced by tracing a line in a film deposited on a plate and are incapable of direct reproduction. At present the tracing so obtained is etched into the plate by an acid, and from the grooved plate thus produced is obtained an electroplate for stamping out the commercial record. This method of producing commercial records has certain defects, so that the copies thus produced are not correct representations of the path of the recording-stylus. In an earlier application (No. 659,170, filed November 19, 1897) I have described an improved method of producing commercial records of this type which are faithful copies of the original. This method consists, briefly, in making the original record-groove of full depth in the first instance, thus avoiding the necessity of etching, next coating the record with a conducting medium, then electroplating, and finally pressing this electroplate matrix into the material to be stamped.

My present invention is broader, applying to records of both the types referred to and

comprising the new sound-recording tablet constituting the subject-matter claimed herein and the process claimed in divisional application, Serial No. 113,327, filed January 26, 1902. Briefly stated, said process consists in making the original record-groove of full size in or upon a surface suitable for recording and which at the same time is itself an electrical conductor, then electroplating the record-surface, and finally using the matrix so obtained as a die or stamp.

To produce the new recording-tablet, I first take any substance that has sufficient body or cohesion to withstand the electroplating and retain its form, while at the same time it must be capable of receiving a record—that is, be readily removable by the recording-stylus with as little resistance as possible. As the original record is not used for reproducing sounds directly, (as in case of graphophone-records,) it need not be near so hard as graphophone blanks. This material may be designated as "wax-like," which term will be used in this application to indicate any plastic material suitable for the purpose that is of sufficient body without offering too much resistance. This wax-like material is then prepared for use by impregnation with some electric conductor, hereinafter called simply a "conductor." As an example, I may take ordinary beeswax and add a little rosin to harden it slightly and then impregnate the mixture with graphite or other suitable conductor. As only that portion of the recording material which will be exposed to the action of the electric bath need be a conducting medium, the graphite (or other conductor) may be impregnated throughout the bulk or body of the material merely to a slight depth beneath the surface, or, in other words, to or slightly below the depth of the sound-groove to be formed therein. The proportion of conducting material employed may be varied according to circumstances, depending upon the character of the ingredients and the kind of conductor employed. The recording material is now shaped into tablets or disks for use. Better effects are obtained by burnishing the surface of the disk before recording.

This gives the surface a beautiful smooth polish and spreads out the particles of graphite (or other conductor) over the recording-surface so as to produce a perfect conducting-surface.

In using the herein-claimed sound-recording tablet in accordance with the process of my said divisional application said tablet is placed upon a suitable sound-recording machine, and the sound-record is made in or upon the surface of the tablet. The grooves are made once for all of full depth and size and require no deepening or enlarging by an etching fluid or otherwise. The record-groove may be either of the vertically-undulated (graphophone) type or of the laterally-undulated (gramophone) type. This finished original record is placed in an electric bath, while a coating or plate of metal, as copper, is deposited thereon by electrolysis. The electroplate and the original are then separated, and the latter may be used repeatedly in the same manner. The electroplate matrix contains a faithful counterpart in reverse of the irregularities constituting the original record of sound. It is pressed into any suitable material that when treated is comparatively yielding (as compared with the matrix) but that is (or becomes) sufficiently hard to retain its shape and withstand reproduction and handling. Electro-se and other fibrous substances are particularly suited for this purpose.

It will be observed that by my improved process I can produce from the original record any number of matrices that may be used to multiply indestructible copies or duplicates, that I avoid the aberrations due to the etching process and the blurrings caused by depositing a conductor upon a record already formed, and that the matrices produced by this improved method are absolutely faithful counterparts of the original and the commercial records for that reason better.

In the drawings annexed hereto to illustrate this invention, Figure 1 shows a recording-tablet A, being a wax-like mixture impregnated with a conducting medium. Fig. 2 shows tablet A being burnished, as by a brush B, the tablet being on a rotating wheel b. Fig. 3 shows the tablet after having the sound-record cut thereon as suspended in the electroplating-bath C. Fig. 4 shows the electro-

plate-die D being pressed into a disk E of fibrous material, and Fig. 5 shows the completed commercial record E.

Having thus described my invention, I claim—

1. A sound-recording tablet made of a material electrically conductive throughout its bulk or body and of such normal consistency as to be acted upon by a recording-stylus actuated by sound-waves in the act of forming a sound-record.

2. A sound-recording tablet composed of a material electrically conductive throughout its bulk or body, of such normal consistency as to be acted upon by a recording-stylus actuated by sound-waves in the act of forming a sound-record, and having its surface burnished.

3. A sound-recording tablet made of wax or wax-like material impregnated throughout its bulk or body with an electrically-conducting material and of such normal consistency as to be acted upon by a recording-stylus actuated by sound-waves in the act of forming a sound-record.

4. A sound-recording tablet made of wax or wax-like material impregnated throughout its bulk or body with an electrically-conducting material in a finely-divided state and of such normal consistency as to be acted upon by a recording-stylus actuated by sound-waves in the act of forming a sound-record.

5. A sound-recording tablet composed of wax or wax-like material impregnated throughout its bulk or body with graphite, and of such normal consistency as to be acted upon by a recording-stylus actuated by sound-waves in the act of forming a sound-record.

6. A tablet for receiving a record of sound, consisting of a non-conductive substance impregnated with a conducting substance the mixture being of such normal consistency as to enable a sound-record to be formed therein by a recording-stylus actuated by sound-waves.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH W. JONES.

Witnesses:

C. A. L. MASSIE,
ELISHA K. CAMP.

No. 728,382.

PATENTED MAY 19, 1903.

J. C. ENGLISH.

DIAPHRAGM FOR MACHINES FOR RECORDING OR REPRODUCING
SOUND OR SPEECH.

APPLICATION FILED MAY 23, 1899.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1,

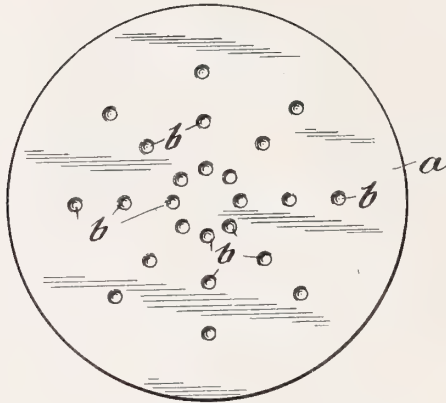


Fig. 2,

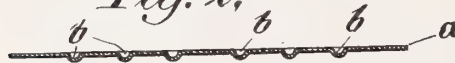


Fig. 3,

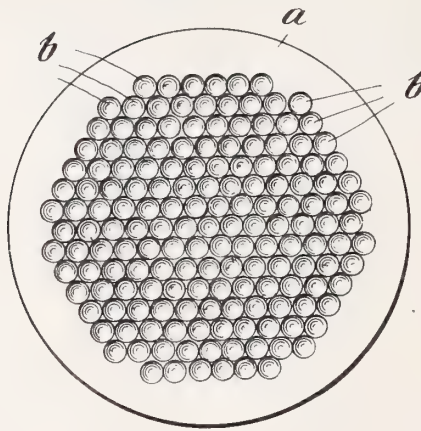
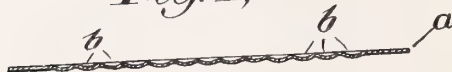


Fig. 4,



WITNESSES:

O. H. Maybrook
Edwin Segar

INVENTOR

John C. English

BY

Kenyon & Kenyon
ATTORNEYS



No. 728,382.

PATENTED MAY 19, 1903.

J. C. ENGLISH.
DIAPHRAGM FOR MACHINES FOR RECORDING OR REPRODUCING
SOUND OR SPEECH.

APPLICATION FILED MAY 23, 1899.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 5,



Fig. 6,



WITNESSES:

D. M. Hayward.
Edwin Seger.

INVENTOR

John C. English

BY

Kempson & Kempson,
ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN C. ENGLISH, OF NEW YORK, N. Y.

DIAPHRAGM FOR MACHINES FOR RECORDING OR REPRODUCING SOUND OR SPEECH.

SPECIFICATION forming part of Letters Patent No. 728,382, dated May 19, 1903.

Application filed May 23, 1899. Serial No. 717,890. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. ENGLISH, a citizen of the United States, and a resident of New York, in the county and State of New York, have invented an Improvement in Diaphragms for Machines for Recording or Reproducing Sound or Speech, of which the following is a specification.

My invention relates to diaphragms for use in machines for recording or reproducing sound or speech. Its object is to provide a diaphragm which will more accurately and faithfully transmit vibrations of sound or speech to be recorded by a recording-style upon a recording-surface or vibrations produced by a reproducing-style from a recording-surface to reproduce sound or speech; also, to improve the quality, tone, and quantity of sound or speech thus reproduced from a recording-surface.

It consists of the novel devices herein shown, described, and claimed.

In the drawings accompanying this specification and forming part hereof, and in which similar letters in the different figures represent corresponding parts, I have shown and will now proceed to describe the preferred embodiments of my invention.

Figure 1 is a face view of a diaphragm embodying my invention. Fig. 2 is a cross-section therethrough. Fig. 3 is a face view of another form of diaphragm embodying my invention. Fig. 4 is a cross-section therethrough. Fig. 5 is a front view of a diaphragm, showing the preferred embodiment of my invention, and Fig. 6 is a cross-section therethrough.

My improved diaphragm consists of a metallic disk of any suitable size and made of any suitable metal, preferably of steel having a flat operative surface, and having one or both of its surfaces distorted. This distortion I preferably produce by providing the diaphragm with indentations. These indentations are shallow and are preferably concentrically arranged, and the number of indentations is preferably greater toward the center of the disk than toward its circumference relatively to the surface of the diaphragm occupied by such indentations.

a is the disk of the diaphragm.

b represents the distortions, here shown as

indentations. The indentations may be made in any manner and may be of any suitable size or shape and may be arranged upon the surface of the diaphragm in any suitable way. While the distortions may be irregular in shape or size or arrangement, I prefer to make them of the same shape and size and to arrange them in some orderly or geometrical manner. Thus in Figs. 1, 2, 3, and 4 the indentations are all alike and each forms a cup-like depression upon one side of the diaphragm and a raised projection upon the other, while in Figs. 5 and 6 the indentations are shown in the form of grooves upon one side of the diaphragm and ridges upon the other. In Fig. 1 the indentations are shown as separated from one another and as arranged in concentric rings. In Fig. 3 they are shown as massed together.

I find that the best effects are produced when the number of distortions are relatively greater for the surface of the disk toward the center of the disk than toward the circumference. I prefer also in practice to use the indentations in the forms shown in Figs. 5 and 6, where the indentations are in the shape of continuous concentric indentations or, in other words, in the shape of grooves or ridges, or both.

I am aware that attempts have been made to use diaphragms whose operative surface was composed wholly of waves or undulations. In such diaphragms the operative surface is not a flat surface or a disk-like surface at all. Upon both sides the surface of the diaphragm goes in and out, rendering the diaphragm very yielding and mobile, particularly at its center, and tending to increase the amplitude of the movements and to diminish the quickness of the same. This is exactly the reverse effect from that produced by my improvement. In my improved device the flat disk-like operative surface is maintained, and the shallow distortions or indentations in the surface tend to strengthen and stiffen the diaphragm and to make it more elastic in the true sense of that term and respond more quickly to the vibrations, especially at the center of the diaphragm, where strength, stiffness, and elasticity are most needed, instead of tending to make the diaphragm more yielding, mobile, and inelastic. I have found that

a flat disk-like surface when thus strengthened transmits vibrations more crisply and sharply and more accurately and faithfully than when such a disk is without distortions or indentations and more crisply, sharply, accurately, and faithfully than does a yielding, mobile, and inelastic diaphragm whose whole surface is not flat or disk-like, but is on both sides thrown into waves or undulations.

10 What I claim as new, and desire to secure by Letters Patent, is—

15 1. A diaphragm for a machine for recording or reproducing sound or speech, consisting of a metallic disk having a flat operative surface provided with shallow distortions concentrically arranged, the distortions being closer together near the center of the disk.

20 2. A diaphragm for a machine for recording or reproducing sound or speech consisting of a metallic disk having a flat operative surface provided with concentric rings of shallow indentations, substantially as set forth.

3. A diaphragm for a machine for recording or reproducing sound or speech consisting of a metallic disk having a flat operative surface provided with concentric rings of shallow indentations, the rings being closer together near the center of the disk, substantially as set forth. 25

4. A diaphragm for a machine for recording or reproducing sound or speech consisting of a metallic disk having a flat operative surface provided with continuous concentric shallow indentations, the indentations being closer together near the center of the disk, substantially as set forth. 30 35

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN C. ENGLISH.

Witnesses:

EDWIN SEGER,

GEO. W. MILLS, Jr.

No. 728,607.

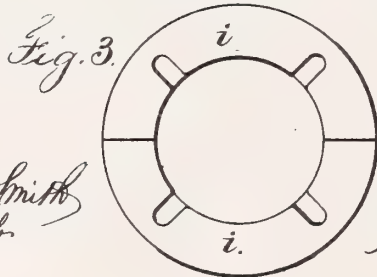
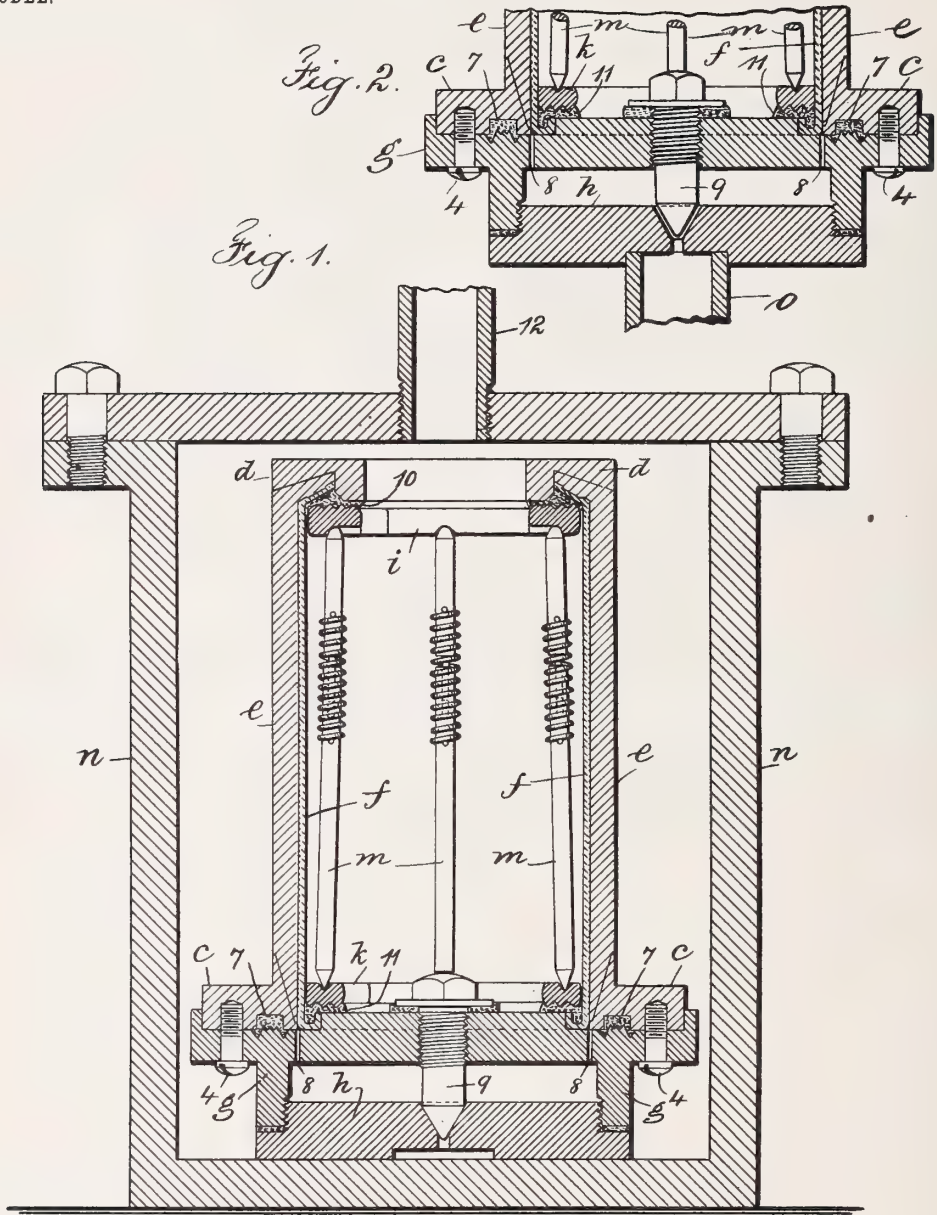
PATENTED MAY 19, 1903.

A. N. PETIT.

APPARATUS FOR FORMING DUPLICATE SOUND RECORD CYLINDERS.

APPLICATION FILED MAY 15, 1902.

NO MODEL.



Witnesses

Chas. H. Smith
J. Stail

Inventor

Ademor N. Petit.

For L. W. Langel & Son

attys

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

APPARATUS FOR FORMING DUPLICATE SOUND-RECORD CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 728,607, dated May 19, 1903.

Application filed May 15, 1902. Serial No. 107,453. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Apparatus for Forming Duplicate Sound-Record Cylinders, of which the following is a specification.

The object of my invention is to produce a more perfect and commercial sound-record of cylindrical form and made of celluloid or other similar or suitable material than it has heretofore been possible to produce in an effort to overcome the harsh and grating sounds usually incident to records of celluloid.

In an application of even date and copending herewith I have illustrated and described a metal matrix suitable for my present invention.

In carrying out my invention the blank of celluloid or other suitable material is preferably made with inturned ends of varying diameters to agree with and fit the taper mandrel of the reproducing-machine, and this blank is passed into the matrix from the lower open end. The matrix is then received upon a suitable base, also formed to receive one end of the blank, and the base and the matrix are to be connected so as to form an air-tight joint. The base is provided with means for exhausting the air and any moisture that there may be between the outer surface of the celluloid blank and the inner surface of the matrix and for maintaining the vacuum after the same has been established. Before effecting this vacuum I insert elastic washers within and at the respective ends of the celluloid blank as the same is in position within the matrix and upon the base, and spring-actuated tension-rods serve to force the elastic washers against the respective ends of the celluloid blank, the matrix, and the base, thus forming an air-tight joint at the ends of the blank not only as the vacuum is being effected, but to prevent the ingress of fluid under pressure afterward employed. Between the spring-actuated tension-rods and the elastic washers I prefer to employ clamping-rings as seats for the ends of said tension-rods and for the purpose of holding and forcing the

elastic washers to place. This apparatus is then placed in the receptacle having a removable cover, and through a pipe of the cover steam or hot water is introduced into the receptacle and within the blank to soften the same and force the blank outward into the interstices of the matrix to produce the reverse of the matrix and make a duplicate sound-record of cylindrical form. This is afterward cooled and removed.

In the drawings, Figure 1 is a vertical section and partial elevation representing the complete apparatus and parts employed by me for carrying out my method of forming duplicate sound-record cylinders of celluloid or similar material. Fig. 2 is a vertical section and partial elevation of the parts directly associated for the purpose of effecting the vacuum, and Fig. 3 is an inverted plan of the upper clamping-ring.

The matrix employed comprises a ring or annulus *c* at the lower end, a ring or annulus *d* at the upper end, and an intervening electrodeposited cylinder *e*, the said parts *c d e* forming an integral whole or matrix in which the blank *f* is received, (referring to Fig. 2,) and after the insertion into the matrix of the celluloid blank the matrix is secured by the screws 4 to a base *g*, which base is provided with a flange interiorly threaded in part and to which the base-block *h* is secured by screwing the parts together with an intervening washer, which forms an air-tight joint. It will be noticed that in the base of the matrix there is an annular groove, and in this I place a packing-ring 7, and the adjacent surface of the base *g* is preferably made with shallow concentric grooves, so that when the matrix and the base *g* are connected by the screws 4 the packing 7 fills the grooves and at this point also makes an air-tight joint. In the center of the base there is a tap-screw 9, passing through the base, with the head above the base, and a washer, preferably of elastic character, between the head and the base, and this screw is made with a conical end, and the center of the base-block is perforated, the upper end of the perforation being conical to receive the conical end of the tap-screw 9.

Within the celluloid blank *f* and at the re-

spective ends (see also Fig. 1) are flexible or elastic material washers 10 11, covered by clamping-rings *i k*, and between said clamping-rings I employ spring-actuated tension-rods *m*, the office of which is to press the clamping-rings apart and press the flexible or elastic washers 10 11 against the respective ends of the celluloid blank and the matrix at one end and the base *g* at the other end, so as to effectually close off the joint between the ends of the celluloid blank and the matrix and base, and so prevent the entrance of air or of any material that may be within the blank passing between the surface of the blank and the surface of the matrix. These clamping-rings *i k* are preferably made in two parts for ready insertion within the matrix and celluloid blank, and they are preferably provided upon their surfaces contacted with by the spring-actuated extension-rods *m* with recesses into which the ends of said extension-rods pass, so as to prevent their shifting from the position in which they are placed. Through the base *g* there are apertures 8, which vertically agree with the line of division between the inner surface of the matrix *e* and the outer surface of the celluloid blank, and before the parts are inserted into the receptacle *n* I apply a device *o* for exhausting air to the lower surface of the base-block *h*, adjacent to the central opening therein and preferably in a recess provided therefor, and at the same time I loosen the tap-screw 9, so as to exhaust any air that there may be between the juxtaposed surfaces of the matrix and blank of celluloid or similar material and to remove also any moisture that there may be between said surfaces, thus preparing for close and intimate contact of said surfaces during the further treatment of the blank. Upon exhausting this air and removing the moisture the tap-screw 9 is forced tightly down to its seat to close off the opening in the base-block *h* and complete the seal of the parts. The apparatus is then placed in the receptacle *n*, the removable cover is fastened thereon, and through the pipe 12 in the cover steam or hot water is introduced into the receptacle and within the celluloid blank and against the inner surface thereof and pressure is applied, the heat softening the blank and the pressure forcing the same outward into all the delicate interstices of the matrix and at the same time forcing the turned-over end of the celluloid blank against the matrix to receive the impression of the same, the intimate contact thus effected being made possible and insured by the previous removal of the air and moisture from the juxtaposed surfaces of the matrix and blank. I do not limit myself to the use of steam or hot water, as any fluid under pressure and in the presence of heat may serve an equal purpose. After maintaining the pressure and heat for the desired period the celluloid duplicate sound-record is cooled, preferably by the introduction of cold water. This fixes the celluloid or similar ma-

terial, reduces it to its normal non-plastic condition, causes a slight shrinkage or contraction of the same, which appreciably separates the surface of the duplicate sound-record cylinder from the surface of the matrix. The apparatus is then removed from the receptacle *n* and the parts separated, and the duplicate sound-record cylinder taken out of the matrix, the same then becoming a finished article of commerce.

It is to be understood that the apparatus before referred to and into which the matrix, its base, and the celluloid blank are placed is preferably to be of such a size that a number of said matrices each containing a celluloid blank may be placed in said apparatus, so that a number of duplicate sound-record cylinders may be made at the same time. The molding of a record with a smooth and perfect surface depends upon exhausting the air between the juxtaposed surfaces of the matrix and celluloid-blank cylinder before the application of heat and pressure to soften and force the material into intimate contact with the matrix-surface; otherwise any air or gases or moisture that may exude from the molding composition during the application of heat and pressure will lodge between the matrix and material and cause the surface of the record-cylinder to yield an imperfect reproduction in which crackling and hissing sounds are in evidence.

Previous to inserting the blank of celluloid or other suitable material in the matrix and applying thereto heat and pressure I may prefer to treat the surface thereof with the solvent preparation described in Letters Patent granted to me December 4, 1900, No. 662,961, so as to slightly soften the surface and insure the most intimate contact.

I claim as my invention—

1. The combination with an electrodeposit matrix having integral ring-like ends, the aperture in the upper of which is of less diameter than the inner diameter of the matrix, of a base to which the matrix is secured and within and between which matrix and base the celluloid blank is received, a base-block adapted to be connected to the base, means for closing the respective ends of the celluloid blank in their relation to the matrix and the base so as to prevent ingress of fluid between the juxtaposed surfaces of the matrix and blank, means for exhausting the air and removing moisture from between said juxtaposed surfaces and for thereafter sealing the same, and means for applying heat and pressure against the celluloid blank for softening and forcing the same into intimate contact with the surface of the matrix, substantially as set forth.

2. The combination with an electrodeposit matrix having integral ring-like ends, the aperture in the upper of which is of less diameter than the inner diameter of the matrix, of a base to which the matrix is secured and within and between which matrix and base the cel-

luloid blank is received, a base-block adapted to be connected to the base, packings for forming air-tight joints between the base and base-block and between the matrix and base, there being perforations in the base in line with the inner surface of the matrix, and a central perforation in the base-block having a conical seat, a tap-screw passing through the base with a conical end seated in the base-block, its head above the base and an intervening washer, flexible or elastic material washers within and at the respective ends of the celluloid blank covering the meeting edges of said blank with the matrix and base, clamping-rings against said flexible or elastic washers and spring-actuated extension-rods between said clamping-rings tending to force the elastic-material washers to their seats, substantially as and for the purposes set forth.

3. The combination with an electrodeposit matrix comprising a body of electrodeposited metal carrying upon its inner surface the impression of the record-cylinder and ends formed of rings or annuli connected with the body and forming an integral matrix, said matrix having an opening at one end of the full internal diameter and a contracted opening at the other end and adapted to receive a blank passed into the matrix at the larger open end, of a base and means for securing the matrix at its larger open end thereto, said base and outer matrix end being so constructed as to receive the ends of the celluloid blank, a base-block to which the base is secured, and means for forming air-tight joints between the matrix and base and between the base and the base-block, elastic devices and pressure devices within and at the ends of the celluloid blank and matrix for sealing the joints of the celluloid blank with the matrix and base, means for exhausting air between the juxtaposed surfaces of the matrix and blank and for sealing the same, means for applying heat and

pressure within the celluloid blank to soften the same and to force the celluloid into intimate contact with the interstices of the matrix, and for thereafter cooling the celluloid for the removal of the finished duplicate sound-record cylinder, substantially as set forth.

4. The combination with an electrodeposit matrix, comprising a body of electrodeposited metal carrying upon its inner surface the impression of the record-cylinder and ends formed of rings or annuli connected with the body and forming an integral matrix, said matrix having an opening at one end of the full internal diameter and a contracted opening at the other end, a tapering internal portion and shoulder and adapted to receive a blank passed into the matrix at the larger open end, of a base and means for securing the matrix at its larger open end thereto, said base being so constructed as to receive the one end of the celluloid blank and said tapering portion the other end, a base-block to which the base is secured, and means for forming air-tight joints between the matrix and base and between the base and the base-block, elastic devices and pressure devices within and at the ends of the celluloid blank and matrix for sealing the joints of the celluloid blank with the matrix and base, means for exhausting air between the juxtaposed surfaces of the matrix and blank and for sealing the same, means for applying heat and pressure within the celluloid blank to soften the same and to force the celluloid into intimate contact with the interstices of the matrix, and for thereafter cooling the celluloid for the removal of the finished duplicate sound-record cylinder, substantially as set forth.

Signed by me this 6th day of May, 1902.

ADEMOR N. PETIT.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.

728/04

E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED JULY 28, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

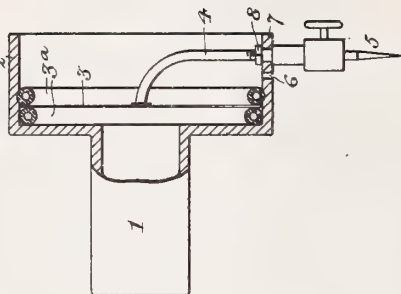


Fig. 2.

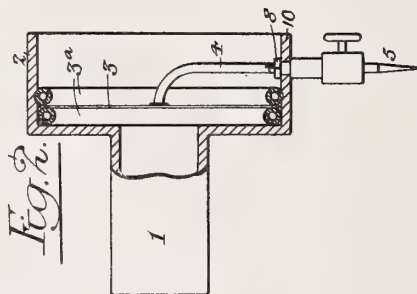


Fig. 3.

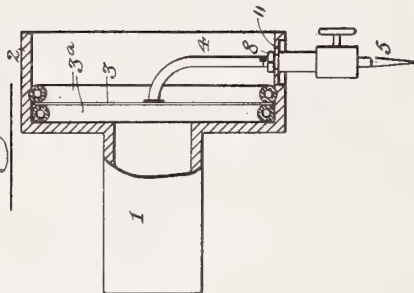


Fig. 4.

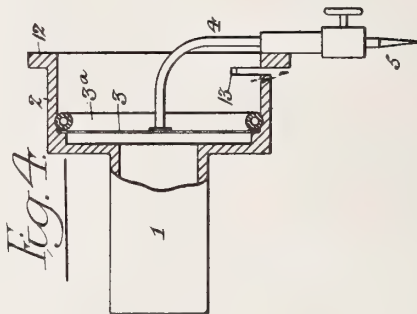


Fig. 5.

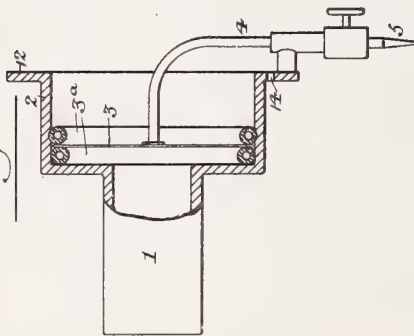


Fig. 6.

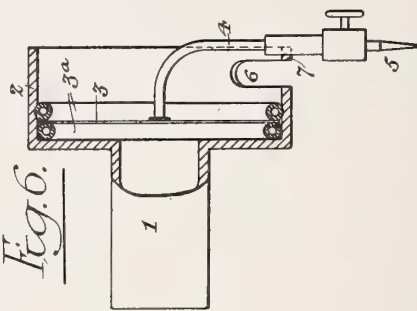


Fig. 7.

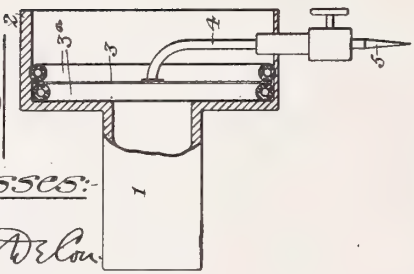
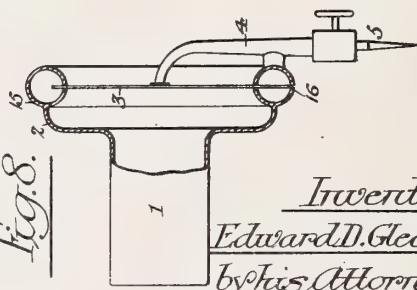


Fig. 8.



Witnesses:

Chas. Wilson
Frank L. A. Graham.

Inventor:-

Edward D. Gleason

by his Attorneys

Howson & Howson



E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED JULY 28, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 9.

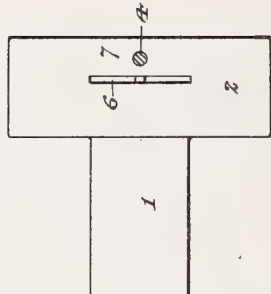


Fig. 10.

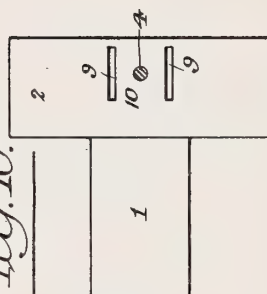


Fig. 11.

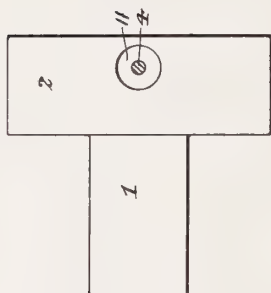


Fig. 12.

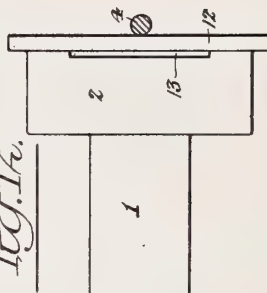


Fig. 13.

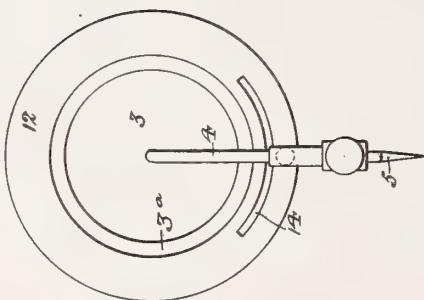


Fig. 14.

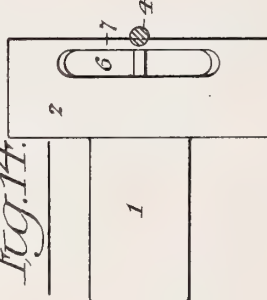


Fig. 15.

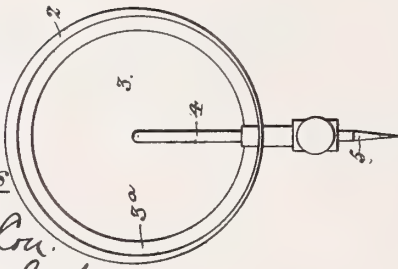
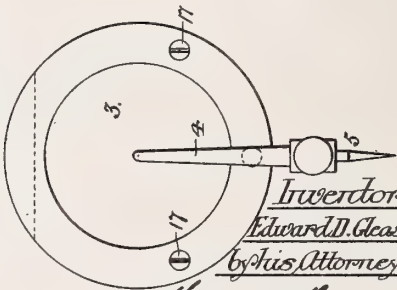


Fig. 16.



Witnesses

Chas. DeCru.
Frank L. A. Graham.

Inventor:-

Edward D. Gleason

by His Attorneys:

Howan & Howan

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
ELLSWORTH A. HAWTHORNE AND HORACE SHEBLE, OF PHILADELPHIA,
PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 728,704, dated May 19, 1903.

Application filed July 28, 1902. Serial No. 117,387. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The object of my invention is to provide a cheap and simple construction of sound-box for talking-machines, whereby the stylus-arm will be provided with an elastic mounting of such character that the vibrations imparted to the stylus by the record will be faithfully transmitted to and reproduced by the diaphragm of the sound-box. This object I attain by rendering elastic or resilient a portion of the diaphragm-casing and mounting the stylus-arm upon this elastic or resilient portion of the casing.

In the accompanying drawings, Figures 1 to 8, inclusive, are sectional views of sound-boxes, illustrating different constructions of the same in accordance with my invention; Figs. 9 to 12, inclusive, are side elevations of the sound-boxes shown in Figs. 1, 2, 3, and 4, respectively. Fig. 13 is a face view of the sound-box shown in Fig. 5. Fig. 14 is a bottom view of the sound-box shown in Fig. 6. Fig. 15 is a face view of the sound-box shown in Fig. 7, and Fig. 16 is a face view of the sound-box shown in Fig. 8.

The sound-box in each case consists of a tubular stem 1 with enlarged or cup-shaped end 2, and in the latter portion of the sound-box the diaphragm 3 is mounted in any ordinary or appropriate manner.

In the structures shown in Figs. 1, 2, 3, 5, 6, and 7 the diaphragm is mounted between inner and outer elastic rings or washers 3^d, the outer ring being fitted to an internal annular recess in the casing 2, and in the structure shown in Fig. 4 the diaphragm rests on an internal annular shoulder and is retained thereon by an outer ring 3^a, while in the sound-box shown in Fig. 8 a special form of mounting for the diaphragm is adopted, which will be hereinafter described.

The stylus arm or lever 4 of the sound-box bears upon or is connected to the central portion of the diaphragm 3, and the outwardly-

projecting portion of said stylus arm or lever carries the detachable stylus 5.

The stylus-arm is mounted upon a portion of the diaphragm-casing which is rendered elastic by reason of a special construction of this portion of the casing, so that while the stylus-arm is normally held in a neutral position it can vibrate with the desired amount of freedom when the stylus 5 is acted upon by the walls of the undulating or wave-like groove of the record, these vibrations being transmitted to the diaphragm 3, so as to cause reproduction of the sounds whereby the record was made.

As shown in Figs. 1 and 9, that portion of the cup-shaped end of the sound-box casing which carries the stylus-arm is rendered elastic by forming therein a segmental slot 6, between which and the outer edge of the casing intervenes a band 7 to which the stylus-arm is secured, the latter result being attained in this structure by reducing the diameter of the stylus-arm, so as to form a shoulder for bearing upon the outer face of the band 7, and threading the reduced portion of the arm for the reception of a nut 8, which bears upon the inner face of the band, and thereby serves to properly secure the stylus-arm thereto.

In that form of sound-box shown in Figs. 2 and 10 slots 9 are formed in the casing 2 on each side of a central band 10, which carries the stylus-lever, and in the construction shown in Figs. 3 and 11 a recess is formed in one side of the casing 2, so as to reduce this portion of the casing to the condition of a diaphragm 11, to which the stylus-arm is secured, this diaphragm being so thin as to provide the desired elastic mounting for the stylus-arm.

The casing 2 of the sound-box shown in Figs. 4 and 12 has a projecting top flange 12, upon which the stylus-arm 4 is directly mounted by soldering or brazing it thereto; but that portion of the flange which carries the stylus-arm is rendered properly elastic or resilient by forming in the casing 2, immediately under the flange, a segmental slot 13.

The structure shown in Figs. 5 and 13 also has a projecting top flange on the casing 2 of the sound-box and a stylus-arm 4 mounted

upon said flange, that portion of the flange which carries the stylus-arm being in this case separated from the casing 2 by means of a segmental slot 14, formed in the flange instead of in the casing.

The sound-box shown in Figs. 6 and 14 is substantially similar to that shown in Figs. 1 and 9, with the exception that the stylus-arm 4 is directly secured to the upper edge of the elastic band 7 of the casing by soldering or brazing instead of passing through said elastic band.

In the structure shown in Figs. 7 and 15 the desired elasticity is imparted to that portion of the casing 2 which carries the stylus-arm by reducing the thickness of the entire casing on that side upon which the stylus-arm is mounted instead of providing a local reduction in the thickness, as in the sound-box shown in Figs. 3 and 11.

In the structure shown in Figs. 8 and 16 the casing 2 of the sound-box has formed upon it a hollow annular rim 15, the upper and lower portions of which are separated from each other throughout the greater portion of the extent of the rim by means of a horizontal slot or saw-kerf 16, which serves not only to render elastic or resilient that portion upon which the stylus-arm is mounted, but also serves to retain in position the diaphragm 3, the latter being inserted in the slot or kerf formed in the hollow rib 15 and being, if desired, securely clamped in position by means of screws 17, which are located so far apart as not to detract from the desired elasticity of that portion of the rim which carries the stylus-arm.

It will be noted that in all of the constructions shown the annular flange of the sound-box casing projects outwardly beyond the diaphragm, and the stylus-lever is mounted upon this outwardly-projecting flange, so that the stylus occupies a plane considerably beyond the plane of the diaphragm, whereby there is a sufficient body of metal in the flange between the stylus-lever and the diaphragm to permit of the recessing or slotting of the flange in order to provide an elastic support for the stylus-lever, thus rendering unnecessary the employment of a special and independent piece as a mounting for said lever and to that extent simplifying and cheapening the construction of the sound-box.

This projecting flange of the sound-box is, moreover, without any joint. Hence the operation of the sound-box is improved, as such joints are apt to become loose, and thereby permit vibrations of the stylus-lever other than those derived from the undulations of the record.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A sound-box for talking-machines having a diaphragm and a casing therefor with projecting side walls which constitute an integral ring, a part of the wall being rendered yielding, and a stylus-lever rigidly connected with said yielding portion of the sound-box walls, substantially as specified.

2. A sound-box for talking-machines having a diaphragm and a cup-like casing therefor having sides projecting beyond said diaphragm, said projecting sides of the casing being without joint therein, and a stylus-lever rigidly mounted upon said jointless projecting side of the casing, which is slotted or recessed to render it elastic, substantially as specified.

3. A sound-box for talking-machines having a cup-like casing made in one piece, a diaphragm mounted in said cup, and a stylus-lever rigidly mounted directly upon a side of the cup which projects beyond the diaphragm, substantially as specified.

4. A sound-box for talking-machines having a cup-like casing made in one piece, a diaphragm mounted in said cup, and a stylus-lever mounted upon a side of the cup which projects beyond the diaphragm, said side of the cup being slotted or recessed to render elastic that portion of it which carries the stylus-lever, substantially as specified.

5. A sound-box for talking-machines having a casing with hollow rib slotted for the reception of the diaphragm, and a stylus-lever mounted upon said slotted rib, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD D. GLEASON.

Witnesses:

F. E. BECHTOLD,
JOS. H. KLEIN.

No. 728,867.

PATENTED MAY 26, 1903.

F. W. H. CLAY.

PROCESS OF MAKING SOUND REPRODUCING RECORDS.

APPLICATION FILED FEB. 15, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

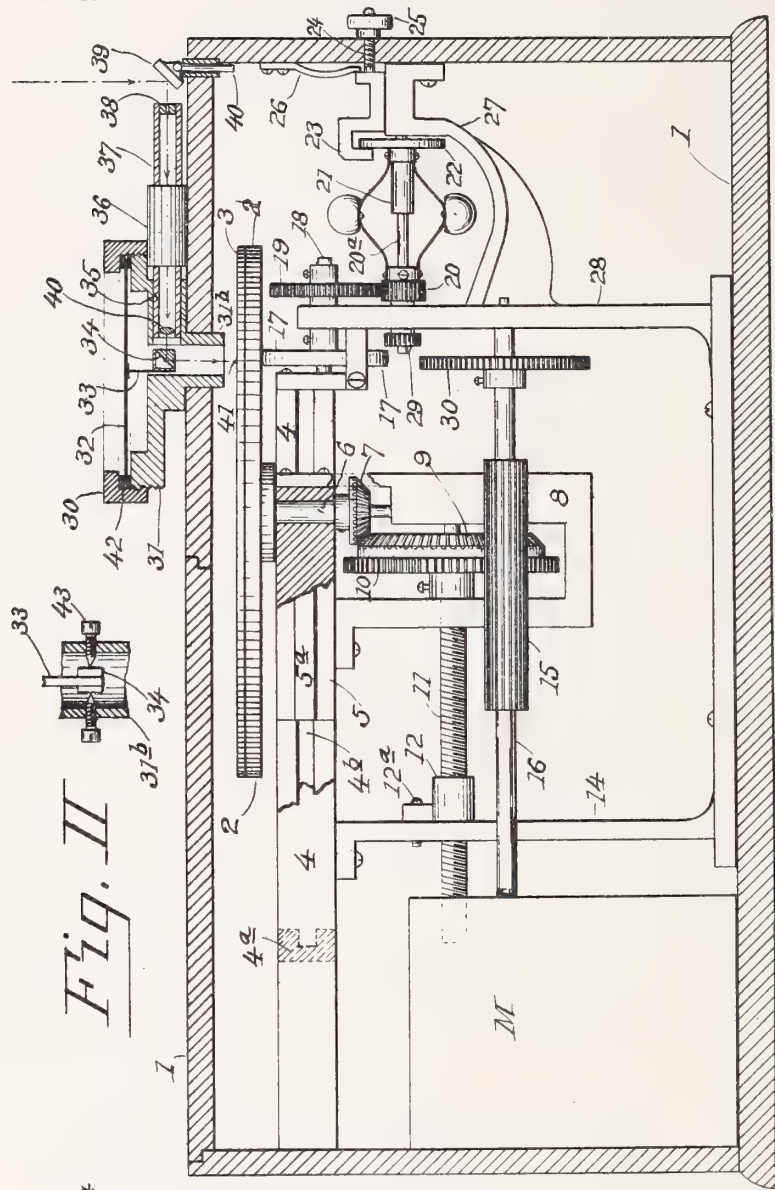


Fig. I

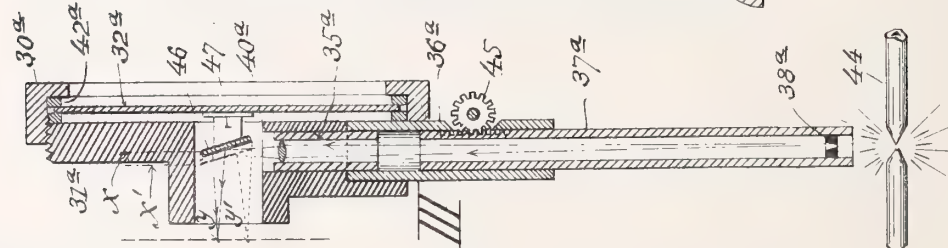


Fig. II

Witness:
Russell S. H. H. H.
Chas. H. H. H.

Inventor,
F. W. H. Clay



No. 728,867.

PATENTED MAY 26, 1903.

F. W. H. CLAY.

PROCESS OF MAKING SOUND REPRODUCING RECORDS.

APPLICATION FILED FEB. 15, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

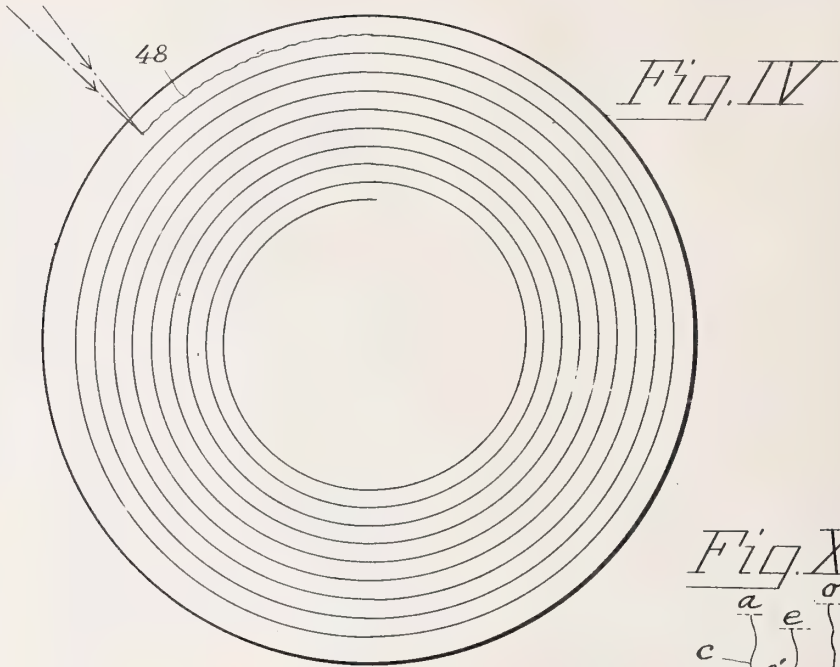


Fig. IV



Fig. V

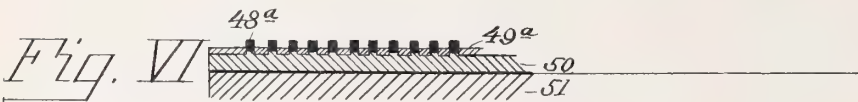


Fig. VI

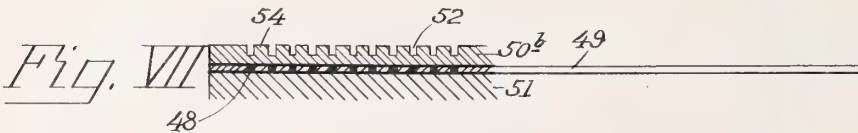


Fig. VII

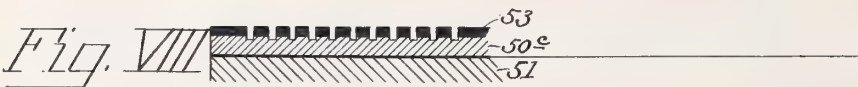


Fig. VIII

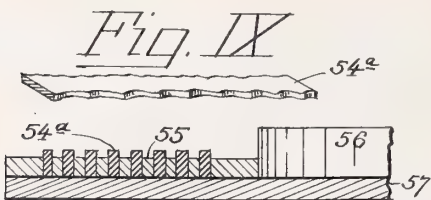


Fig. IX

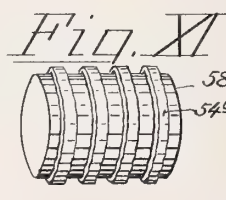


Fig. XI

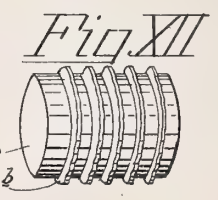


Fig. XII

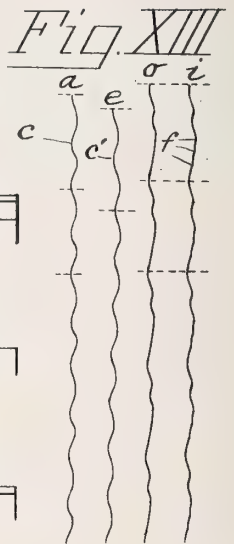


Fig. XIII

Witness;
Russell Wilson
Charles Urban

Fig. X

Inventor,
F. W. H. Clay

UNITED STATES PATENT OFFICE.

FRANCIS W. H. CLAY, OF CINCINNATI, OHIO.

PROCESS OF MAKING SOUND-REPRODUCING RECORDS.

SPECIFICATION forming part of Letters Patent No. 728,867, dated May 26, 1903.

Application filed February 15, 1901. Serial No. 47,389. (No specimens.)

To all whom it may concern:

Be it known that I, FRANCIS W. H. CLAY, a citizen of the United States, and a resident of Cincinnati, in the State of Ohio, have
5 invented a certain new and useful Process of Making Sound-Reproducing Records, of which the following is a specification.

My invention relates to the recording and reproducing of sound; and it consists, primarily, in the process of photographing the
10 movements of sounding bodies and reducing the photographic record to a form to actuate a reproducer by the employment of chemical agencies.

15 It also consists in the record produced and in certain other features hereinafter set forth.

In the present phase of my process the photorecord is made on a flat film of disk form, and for carrying out the process I have
20 invented the apparatus illustrated in the accompanying drawings.

Figure I is a vertical section of the exposing-box, showing the recording-machine in side elevation. Fig. II is a vertical section
25 at right angles to that in Fig. I of the tube containing one form of an actuating-mirror, showing the latter on its pivots. Fig. III is a section of another and more preferred form of the actuating vibrating diaphragm and its
30 attached mirror and the telescope for the same. Fig. IV is a plan view of the photographed record. Figs. V, VI, VII, VIII are sectional views of the gelatin films in several forms of the development hereinafter specified. Fig. IX is a perspective view of a portion
35 of gelatin record-ribbon. Fig. X is a sectional view of a form of record made up of the said ribbon for reproduction. Figs. XI, XII are perspective views of two other forms of arranging the ribbon-record for reproduction. Fig. XIII represents some sound-waves.

In the drawings, Fig. I, the dark box 1 contains a circular revolving table 2, upon which is placed the photographically-sensitive plate
45 or film 3. This table moves in such a way as to cause the point of incidence of a ray of light entering at 41 to travel over the film in a general spiral path. The table 2 has its spindle 6 journaled in a block 5, which slides
50 and is supported by guide-flanges 5^a in grooves 4^b in the two parallel guide-bars 4, (which latter are of the sectional shape shown at 4^a.)

The sliding block 5 carries the depending bracket 8, in which are journaled the shaft 6 of the table and a screw and shaft 11, which
55 carry, respectively, the bevel gear-wheels 7 9 and the spur-wheel 10. The screw 11 engages a split nut 12, mounted on a pivot 12^a on the strut 14, so that it may open and allow the screw 11, and therefore the bracket 8, the block
60 5, and table 2, to freely slide to and fro. The wheel 10 engages a long pinion 15, carried on the shaft 16, and this latter is driven by the motor M. The table and the film then revolve and advance under the light-ray as required. 65
This motion for the principal purpose of the process must vary in speed, so that at all times the point under the impinging light-ray moves at a constant rate. Directly under
70 the point of incidence of the ray 41 is a brush-wheel or friction-wheel 17, mounted on a shaft 18, which carries also the spur-wheel 19, which impels the pinion 20 of the friction-governor 21 22. The disk 22 of the latter is in contact with the rubber 23, which is regulated
75 in position by the screw 24 and nut 25, the spring 26 holding it forward against the nut. The path of the light-ray then moves at constant speed by the well-known action of the governor. In case it is desired to re-
80 solve the table 2 at a constant rotary speed the set-screw on the wheel 19 is loosened, and the wheel 30 on the driving-shaft 16 is brought in mesh with the auxiliary pinion 29 to drive the governor. 85

The sound-receiving diaphragm 32 is inclosed in a housing 30 31 between rubber
cushions 42. At its center is erected a light flexible strut 33, which is attached to the inclosing casing of a camera lucida or other re-
90 flecting-mirror 34, which is mounted on delicate pivots 43, as shown at Fig. II. In the side of the housing 31 is a telescope 35 36 37, having a very small aperture in an end block 38 and carrying a lens 40 at the inner end. 95
The focus length of the lens is such that the rays come to a focus on the surface of the film 3 at 41 after reflection from the surface 34. The direct sun's rays or the rays of an
100 arc-light are directed on the lens 40 through the aperture 38 by a reflector 39 on a pivot 40. It will be plain that the vibration of the diaphragm 32 due to sound-waves will oscillate the reflecting-surface 34 and cause the

point of incidence 41 of the focused light-rays to move radially to the revolving table and film a distance precisely proportioned to the said vibration of the diaphragm, for the angular vibration of the mirror is the antitangent of the rectilinear vertical motion of strut 33, while the lateral play of the ray at 41 is the tangent of the same angle multiplied by the distance of the mirror therefrom, which is a constant. It is also plain that the amplitude of lateral vibration of the point of incidence may be regulated at will by changing the said distance of the mirror from the film. The thickness of the photographed line is regulated by the size of the aperture at 38. If the mirror or camera lucida 34 be nicely balanced at its center of gravity, it is found that in the more rapid vibrations the mirror will oscillate about its own gravity-axis, and therefore is absolutely accurate, whatever retarding is occasioned by its inertia occurring in both phases of the vibration; but in slower vibrations the inaccuracy in the pivot-points may effect the light-ray's motion. Therefore I prefer the form of actuator shown at Fig. III. In this instance a rigid strut 47, mounted at the center of the diaphragm 32^a, carries a surface-mirror 46, set an angle less than forty-five degrees to the line from the source of light. When this reflector moves forward from the position X to the dotted-line position X', it is plain that the focus-point $y y'$ of the reflected rays will move sideways a greater distance, as indicated. This obtains any desired amount of exaggeration in the vibration, depending on the angle at which the mirror is set, and it is absolutely accurate in recording the motion of the diaphragm. The resulting "sound-photograph" is illustrated at Fig. IV. After the ordinary development, as in the case of a common dry-plate, the photograph becomes a laterally-undulating black or opaque line proceeding in a generally spiral path on the surface and consisting of a fine powder of metallic silver suspended in the outer portion of the film. This line is to be formed directly into a groove or a ridge—that is, the color form is to be made into a material shape to actuate a reproducing instrument. In order to attain this end, I use any thick gelatinous material, such as gelatin, which when sensitized by ammonium or potassium bichromate has the property of becoming insoluble when acted on by light. This may be done in several ways.

First. I use in the recording the specially-prepared plate shown at Fig. V. On a base 51 is placed a thick sheet of pure gelatin 50, and on this a sensitive silver-bromid emulsion 49. After the photograph is made, developed, washed, and well dried this double film is placed in a potassium-bichromate solution and sensitized. After drying in the dark it is exposed to light with the photograph side up. Thereupon the gelatin, which is transparent, becomes insoluble, while that

part having the black precipitate in it and the gelatin under it are protected and are still soluble. Now if we treat this film to a bath of acid the lime is entirely dissolved except that part containing silver, and this part is dissolved also, with the exception of the outer skin on the photograph. (It is even possible to dissolve the entire substance containing the silver.)

Second. If instead of the acid-bath we place the double film in a bath of hot chrome-alum, the black portion and the gelatin under it will swell, while the hardened portions, which have been in the clear, will not absorb water, and the result will be a high ridge along the line, as at 48^a in Fig. VII. Now pour upon this a plastic material and allow it to set. It forms a plate having the groove ready for commercial use for reproducing.

Third. By originally sensitizing the thick part of the film 50 with bichromate, then covering it with a thin coat of collodion before superposing the silver film 49, I may proceed by developing and drying in the dark and then re-exposing to affect the thick part 50, after which I develop the whole in pure acetic acid, which will dissolve away the whole top film 49, the collodion coat, and the unexposed parts of the under film 50. This makes the most accurate record. It may be duplicated by using it as a matrix-die to form a matrix for making duplicates for commercial use.

Still another method of reproducing is to dissolve the under film entirely through in the acid-bath when the result is to separate the gelatin along the record-line into a narrow ribbon. This has on its edge the sound-record and is arranged for reproduction in the manner indicated in Figs. IX, X, XI, or XII. The form of Fig. X is made by winding the ribbon 54^a about a central hub 56 with its edge seated on the plate 57 and having between its layers a packing 55, so that the record-ribbon forms a spiral ridge with the operating-surface practically all in a plane, or if the filling 55 be wider than the ribbon 54^a of course the resulting record-surface forms the bottom of a groove instead of the top of a ridge. This may be used as a die. However, I am not limited to the mode of treating the sound-photograph. The treatment to alter the elevation of the record-line may be varied in other ways still, and I have shown and claimed a more direct way in my copending application, Serial No. 109,513, which comes under the broad process as herein set forth.

In all these forms the essentials of the process are the same—namely, the making of a line-record by the use of a vibrating means having no inertia and the forming of this line into an undulating surface directly in an amorphous material and without the use of any tools or other instrumentality than chemical agents. This results in a record made with absolute accuracy, not affected by any

transferring of the line from one surface to another, and being formed in a material which of its own nature necessarily takes a fluid form having no granular, striated, or crystalline structure even of the minutest dimensions. The sound-waves represented in Fig. XIII represent the relative times and intensities of the several distinct impulses in a cycle of changes felt on the receiving-diaphragm and caused by the sound-waves in air. The curve being made up always of one fundamental impulse-cusp and various overtone impulse-cusps $c c' f$, intermingled regularly at shorter intervals, it is evident that the record will not be faithful if the recording agency be retarded in one direction more than in the other or be retarded constantly enough to cause the omission of the overtone-cusps. Also if the operating-surface formed from the line-record has any roughness this must appear in the reproduction, and hence there can be no perfect reproduction of sound-waves where the record-line is transferred or where it is originally made by a graving-tool or made in a metal by acids, since all metals are crystalline in their minutest construction and are left in that form by the action of acids.

It will be understood that by the use of the terms "gelatin" or "bichromated gelatin" herein I mean any substance which has the described property of becoming insoluble in the presence of light by that agency of any salt.

The apparatus herein described and the novel double film of gelatin used in the process and herein described I do not claim herein; but the same will be claimed in other applications, and the phase of the process resulting in the ribbon form and the made-up disk-record, as illustrated in Fig. 10, I do not claim herein; but the same is claimed in my copending application, Serial No. 17,773, filed May 23, 1900.

What I claim herein, and desire to protect by Letters Patent, is the following:

1. The process of making sound-records by photographing the movements of a pencil of light actuated by sound-waves and caused to impinge on, and proceed in a general spiral path over, a sensitive film, and developing this phototrace to produce a groove of uniform width having lateral undulations, in the said film.

2. The process of making sound-records which consists in vibrating a pencil of light in consonance with the movements of a body actuated by sound-waves, moving an amorphous sensitized film under the point of incidence of the pencil so that it travels over a spiral path, developing this trace of the light on the film into an undulating surface in the film by chemical means.

3. The process of making sound-records by photographing the vibrations of a sound-actuated pencil of light impinging on the surface of a double film of amorphous material,

developing this trace of the light into a color form as an opaque line on the upper part of the film, resensitizing the double film, re-exposing to harden the clear parts of the film, and then by chemical means altering the relative elevation of the film along the said trace, to form a rilievo in the said film for the purpose of actuating a reproducing-stylus.

4. The process of making a sound-reproducing record by photographing the motions of a sound-actuated pencil of light on a double gelatin film having a part sensitized to quick action of light, developing to render the resulting trace opaque, sensitizing the film anew in bichromate of potash, re-exposing the film to harden the clear portions of the same, chemically developing to alter the relative elevation of the film along the said trace, and taking a cast of the resulting form-line on the film, for commercial use as a reproducing-record, as described.

5. The process of making sound-records by photographing the trace of a sound-actuated pencil of light moving in a general spiral path, on the upper surface of a double film composed of silver-bromide gelatin and bichromated gelatin, developing the trace into a black line on the upper film, re-exposing to affect the under film, and dissolving out the parts protected from light by the said line in the compound film, to form a groove in the said compound film.

6. A sound-record consisting of a line photographically traced and chemically developed into a groove in an amorphous material by chemical means, the said line being of uniform width and depth and having lateral undulations.

7. A sound-record consisting of a spiral path having lateral undulations and constant width and elevation, traced on the surface of an amorphous material by the action of light and chemically changed in elevation from the original surface of the said material, as described.

8. A photophonogram having an undulatory operating-surface corresponding to sound-waves and composed of an amorphous material rendered insoluble by the action of light and formed by tracing with a pencil of light and dissolving out the exposed portions of the said trace to form a groove.

9. A photophonogram having a spirally-arranged undulatory operating-surface in the form corresponding to sound-waves and composed of an amorphous material rendered insoluble in the portions surrounding said undulating surface by successive exposures to the action of light.

10. A sound-record consisting of a double film of gelatin having a photographically-traced line of undulating form and constant width thereon, the surface along said line being dissolved out to form a groove in the gelatin, by rendering the other parts of the gelatin insoluble by the action of light.

11. A sound-record consisting of a spirally-

arranged laterally - undulating groove in a
compound sheet of gelatin, the upper surface
of said sheet being blackened by the action
of light on silver bromide and the gelatin
5 under the same being dissolved out while the
rest of the sheet is rendered insoluble by the
action of light.

In testimony of the foregoing I hereunder
sign my name in the presence of two wit-
nesses.

FRANCIS W. H. CLAY.

Witnesses:

BERTHA O. ROSS,
CHAS. H. URBAN.

129.798

No. 729,798.

PATENTED JUNE 2, 1903.

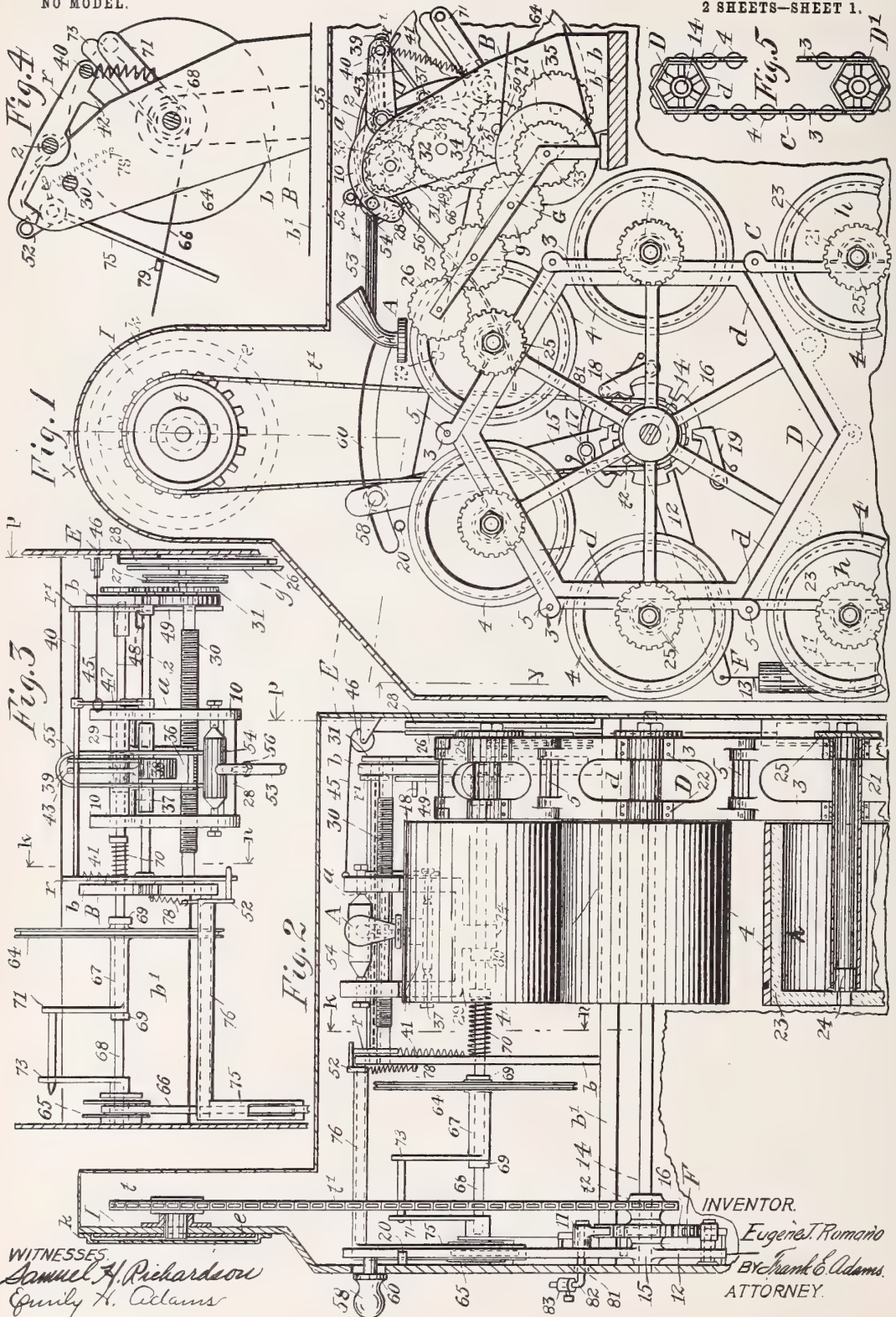
E. J. ROMANO.

INSTRUMENT FOR RECORDING AND REPRODUCING SOUND VIBRATIONS.

APPLICATION FILED FEB. 21, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES
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APPLICATION FILED FEB. 21, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

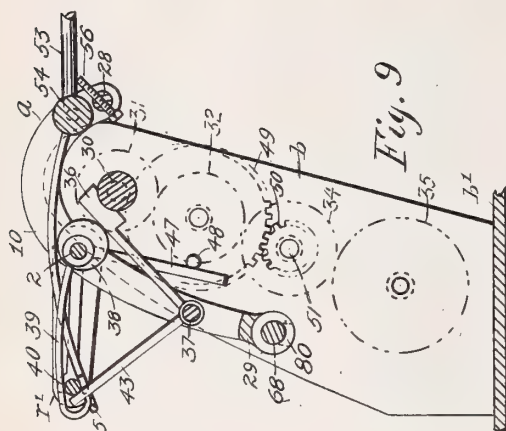


Fig. 9

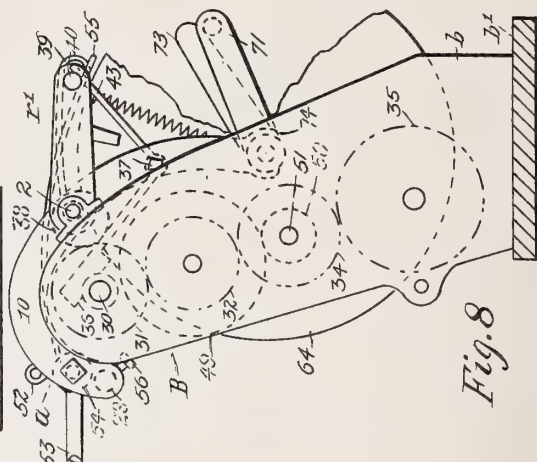


Fig. 8

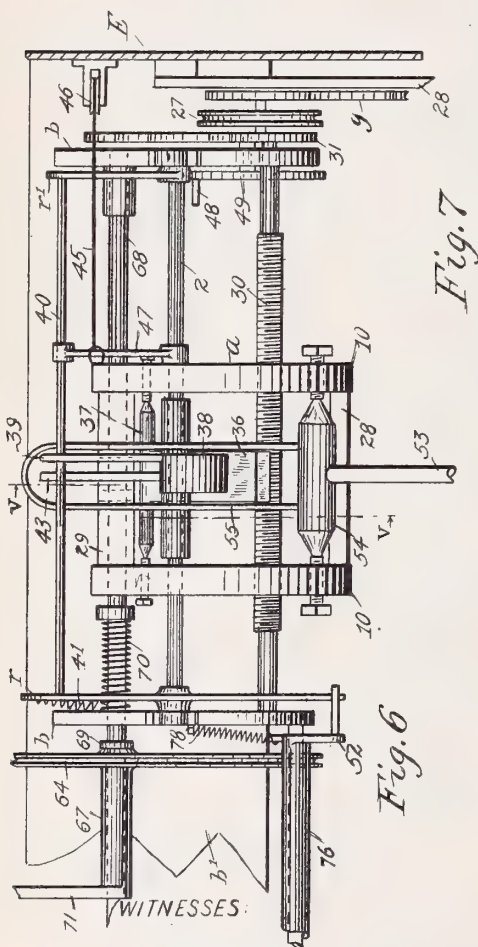


Fig. 6

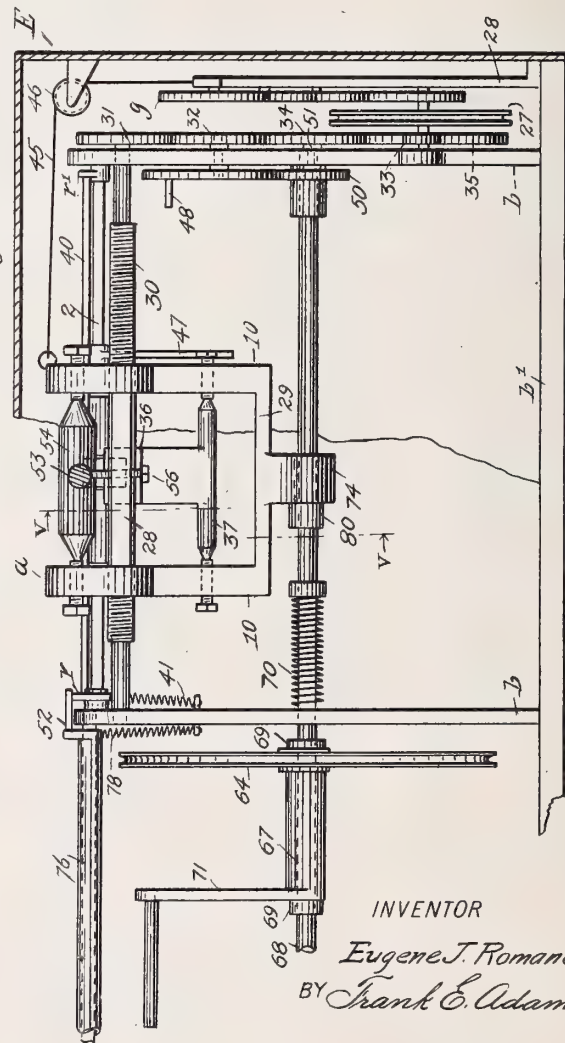


Fig. 7

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UNITED STATES PATENT OFFICE.

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INSTRUMENT FOR RECORDING AND REPRODUCING SOUND-VIBRATIONS.

SPECIFICATION forming part of Letters Patent No. 729,798, dated June 2, 1903.

Application filed February 21, 1901. Serial No. 48,305. (No model.)

To all whom it may concern:

Be it known that I, EUGENE JOSEPH ROMANO, a citizen of the United States of America, and a resident of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Instruments for Recording and Reproducing Sound-Vibrations, of which the following is a specification.

My invention relates to instruments for recording and reproducing sound-vibrations, and in the present embodiment has special reference to devices of the nature above mentioned classified as "multiple-tablet" graphophones.

Among numerous desirable objects attained by my invention and readily comprehended from the accompanying drawings and following specification is a multiple-tablet carrier of variable and comparatively unlimited capacity, simple and inexpensive construction, and positive and reliable action, simplified and effective means for operating the tablet-carrier, like mechanism for controlling the correlative movements of the reproducer, and preferred structural features incidental to the embodiment of the objects.

With reference to the drawings heretofore mentioned and included as a part of this specification, Figure 1 is a vertical transverse section of the upper portion of a case on lines *p* of Figs. 2 and 3, disclosing the mechanism of the instrument as preferably embodied and viewed as the arrows fly. Fig. 2 is a similar section on lines *x y* of Fig. 1 looking as the arrows indicate. Fig. 3 is a plan view of the mechanisms with the tablet-carrier and attendant parts removed. Fig. 4 is a vertical transverse section, on large scale, taken on line *k n* of Fig. 3, indicating portions of the mechanism adapted to automatically control the reciprocative movements of the carriage. Fig. 5 is a side elevation of the tablet-carrier, on reduced scale, indicated with a portion broken away. Fig. 6 is a similar view to Fig. 3, on large scale. Fig. 7 is a rear elevation of the parts disclosed in same, on like scale. Fig. 8 is an elevation of the right-hand end of Fig. 7 with the case removed, and Fig. 9 is a sectional elevation on lines *v* of Figs. 6 and 7 viewed as the arrows indicate.

Like characters of reference indicate corre-

sponding parts throughout the several views of the drawings.

In the preferred embodiment of my invention the reference character A indicates a reproducer of any suitable or ordinary construction which is conveniently rendered operative for the inscription or transcription of a tablet brought to cooperate therewith and is preferably supported from a reciprocable carriage, as *a*, slidably mounted upon a way, as 2, fixed in a suitable frame B.

Related to the reproducer is a movable tablet-carrier C, whose travel, as first considered, involves a movement of the mounted tablets parallel a plane radial to their own axes and comprehends any form of a device rendered operative to move the mounted tablets in a straight course during displacement or replacement.

As now considered pliability is incorporated in the construction of the tablet-carrier to conveniently render it mountable in various ways, and in the present instance the carrier comprises a belt. This belt is preferably composed of a series of interlocking units, as links 3, which conveniently render the carrier extensible and contractible to vary the capacity thereof, and as such embraces any form of a carrier rendered adjustable for the exclusion or inclusion of tablets. Each of the units 3 is preferably adapted to carry a single tablet, as 4, and is conveniently rendered detachable from the series by means of removable pintles 5, which are included in suitable hinge-joints adapted to connect the units in any ordinary or suitable manner. The carrier is thus rendered both separable and pliable and made to include, in addition to variability in capacity, divisional features comprehending the separation of the carrier into sections which shall individually embrace any desired number of tablets for the inscription or transcription of a prolonged series of sound-waves.

The tablet-carrier is conveniently mounted in cooperative relation with a reproducer, as A, upon a rotatable wheel, as D, Fig. 1, which also preferably embodies features for driving the carrier, and comprehends any suitable device adapted for the support of a tablet-carrier, as stated, or to perform the functions of a driver therefor when operated.

As such, the mount includes a pulley of the preferred form shown, having a polygonal rim conveniently composed of a series of planes, as *d*, individually conforming in length to a unit of the carrier, whose movements are thus rendered positive.

As now considered the tablet-carrier embraces any plurality of units, including a minimum number required to form a continuous series or rim about the mount D, which in the present embodiment requires six. When the carrier is extended to accommodate a comparatively greater number of tablets, a suitable idler, as D', Fig. 5, of substantially like form to the mount D, is conveniently positioned in any desired manner (not shown) at a point more or less remote, in conformity to the carrier's length, and serves to guide the same. Likewise other idlers can be placed at divergent points to guide the carrier in a sinuous course as permitted by its pliability and readily understood, and there by support it in any length and comparatively small space.

The wheel D is conveniently poised in relative position to the reproducer A by fixing it upon a shaft 14, suitably journaled to a case, as E, and preferably intermittently rotated by a suitable gravity-motor, as F. This motor comprises in the present instance a bell-crank 15, which is conveniently pivoted on said shaft, and a weighted cord 13, attached to an arm 12 of the crank, and the device is operatively engaged with said shaft for intermittent actuation thereof by a pawl-and-ratchet contrivance, consisting of a ratchet, as 16, fixed on the shaft, and a pawl 17, pivoted to the bell-crank in operative relation to the ratchet, whereby a forced movement of the bell-crank against gravity will ride the pawl over the ratchet, and upon expulsion of said force the pawl will engage the ratchet to drive the shaft a predetermined part of a revolution, as promoted by the fall of a suitable weight 11, attached to the cord 13, and as determined by a suitable stop 20 in the path of the returning crank.

Suitable operative dogs, as 18 and 19, are pivoted to the case E to engage the ratchet 16 and conveniently hold the mount steady during the setting of the gravity device for movement of the carrier. As the device is set the dog 18 is conveniently disengaged by the bell-crank 15 contacting same and forcing it to swing free of the ratchet as the pawl 17 engages therewith. The pawl 19 will then be forced to ride, as the gravity device acts to impel the mount to travel a predetermined distance, relatively conforming to the spacing of the tablets and fixed by the stop 20.

If desired, the instrument can be conveniently rendered adjustable so as to automatically repeat the transcription of the same tablet by fixing the pawl 17 to its pivot and extending same through a suitable slot 81 in the case, Fig. 2, and providing an arm 82 on the outer end of the pivot carrying an ad-

justable counterweight 83, adapted to hold the pawl from engagement with the ratchet 16 when set at the outer end of said arm.

The gravity-motor is conveniently set for operation of the tablet-carrier by force auxiliary to that driving the instrument and conveniently applied either manually or automatically to move the bell-crank 15 against gravity of the weight 11. The auxiliary force is conveniently applied in the former instance through the medium of a knob 58, attached to said crank and projecting from a suitable slot 60 of the case E, and in the latter instance through suitable clutch mechanism operated by a motor. This mechanism is brought into coöperative relation to automatically set the gravity device by the action of movable mediums controlled by the driving mechanism impelling the tablets to rotation and the reproducer to productive travel, as will be understood from the following:

Inasmuch as the primary object of the tablet-carrier is to bring a tablet into coöperative relation with the reproducer and to then displace it when it shall have been traversed, it is obvious that the tablet can be mounted in various ways; but in the present embodiment it is preferred that the carrier shall also be made to support the tablets, and in view of this tablets, as 4, are suitably positioned on rotatable mandrels, as *h*, said mandrels having suitable axles 24, which are operatively mounted in tubular bearings 21, fixed transversely the units or links 3 by straps 22 or other suitable means and projected to one side of the units as desired to journal the mandrels.

The mandrels are each preferably composed of a drum, as 23, upon which a tablet is removably seated in any usual manner and has a single end, to which an axle 24 is fixed. This axle is of convenient length to pass entirely through any one of the tubular bearings 21, so as to connect with suitable means for the rotation of the tablet, said means comprising in the present instance a spur-gear, as 25, fastened to said axle, and a driver therefor, as 26, which gears are coöperatively engaged when the respective tablet is brought into coöperative relation with the reproducer.

The driver 26 is preferably mounted on a suitable pivot supported by a fixed arm, as G, and is conveniently rendered continuously operative during productive travel of the reproducer, being in the present embodiment actuated by a train of gears *g*, individually pivoted to said arm and driven by any suitable common means, as a pulley and belt 27, which transmit power from a motor of any desirable class and are also conveniently used to drive the carriage of the reproducer, as set forth in the following:

The carriage *a* may comprise any suitable or ordinary form, but preferably consists of curved side pieces, as 10, conveniently connected at the ends by ties, as 28 and 29, whereby they are rigidly joined for the support of

the reproducer, and instrumentalities for effecting automatic reciprocative action of the carriage along the way 2, which way is fixed to suitable end pieces *b* of the frame B, mounted on a base *b'*, supported by the case E.

30 indicates the ordinary drive-screw for imparting productive movements to the reproducer and which is journaled in the frame B and mounts a gear 31 exterior thereof.

This gear meshes with a suitable train consisting of spurs 32, 34, and 35, which are pivoted to said frame and operatively coupled to the spindle of the driving-pulley 27 by a gear 33, fixed thereto in coöperative relation with the gear 35, whereby the screw 30 is actuated relatively to rotations imparted to a tablet by the gear-train *g*.

A part-nut, as 36, formed to fit the thread of the drive-screw 30, is conveniently mounted in the carriage *a* at the free end of a suitable arm supported by a pivot 37 and is applied to the screw by a suitable cam 38, conveniently pivoted in the carriage and adapted to force the nut to engage with the screw to drive the carriage.

The cam 38 is operated by lateral movements of a bar, as 40, to which it is operatively connected by a stem 39, and said bar is supported transversely the frame B at the free ends of suitable rock-arms, as *r* and *r'*, which are for convenience pivoted to the extremities of the way 2 and when raised cause the bar to move the cam to apply the part-nut and when lowered to operate the same and release the nut.

To insure disengagement of the part-nut as the bar 40 falls, a stem 43 is connected to the arm thereof and slidably engaged with said bar, so as to swing the nut free of the drive-screw as the cam is operated to release same.

The reproducer A is preferably supported at the free end of an arm, as 53, extending laterally from a rotatable hub 54, which is suitably pivoted transversely the carriage *a*, so as to poise the reproducer over the tablet-carrier in coöperative relation with a tablet. Fixed to the hub 54 is a stem 55, which is extended to engage the bar 40 for disengagement of the reproducer from the tablet as the bar falls and to permit it to return by gravity to engage the tablet as the bar is raised, and a screw, as 56, is adjustably engaged with the tie 28 of the carriage to support the arm 53 when lowered and is adapted to adjust the reproducer and secure proper coöperative position thereof with relation to the tablet. As the carriage-rests in initial position the bar 40 is automatically raised to advance the same by the movement of an angle-lever 47, which is conveniently fulcrumed on the carriage with one extremity slidably engaged with the bar by a suitable bifurcation and the other pendent in the path of a movement of a suitable stud 48. This stud is preferably mounted on a gear 49, which is pivoted to the frame B and driven by a gear 50, fixed on the axle 51, to which the gear 34 of the drive-

screw train is attached, and thereby brought to contact with the pendent arm of the angle-lever to raise said bar as the drive-screw 30 is rotated, when a suitable catch, as 52, preferably located at the opposite end of the frame, is conveniently forced by a spring 78 to engage the rock-arm *r* and secure the bar in raised position with the part-nut engaging the drive-screw and the reproducer engaging the tablet.

The catch 52 is automatically tripped to disengage it from the rock-arm *r* as the gravity device F is set, whereupon a spring, as 41, will then act to return the bar 40 to its lowered position, and thereby disengage the part-nut 36 from the screw and raise the reproducer free of the tablet, when the carriage is free for retraction by any suitable means, as weighted cord 45, attached thereto and passed over a pulley 46 and acting to return the carriage to initial position as the gravity device actuates the tablet-carrier to replace the transcribed tablet.

The catch 52 is preferably tripped automatically by applying thereto the force employed to set the gravity device for actuating the carrier simultaneously with the expulsion of said force occurring at the termination of the productive travel of the reproducer. This trip is conveniently accomplished when the device is set manually by rendering said catch operative by the bell-crank 15 as it reaches advanced position through the medium of an arm 75, extended to lie in the path of travel of said crank from a rotatable sleeve, as 76, which carries the catch and is preferably pivoted to the frame B in coöperative relation with the rock-arm *r*. Thereby the crank when advanced will strike the arm and trip the catch for the fall of the bar 40, thus permitting productive travel of the reproducer to be terminated when desired by advancing the bell-crank.

The auxiliary force to automatically set the gravity device is applied from a suitable motor through a pulley, as 64, which is conveniently made to intermittently actuate suitable means adapted to impel the bell-crank 15 to move against gravity of the weight 11, said actuations being suitably controlled by clutch mechanisms operated by and during the travel of the carriage *a*.

Attached to the bell-crank is a tape, as 66, also attached to a reel 65, which is mounted in suitable bearings and rendered rotatably operative to wind the tape by means of clutch mechanism intermittently operated by the pulley 64 as determined by the advance of the carriage *a*. The pulley 64 is conveniently fixed to a sleeve 67, loosely mounted between fixed collars 69 on a shaft 68, which is mounted transversely the frame B and is free for reciprocative rectilinear movements as promoted by the advance of the carriage *a* and retractive action of a spring, as 70, confined between a collar fixed to the shaft and one side piece of the frame B. Fixed to the sleeve

67 is a suitable clutch in the form of a crank 71, carrying an extended pin adapted to engage with an arm 73, fixed to the reel 65, so as to cooperate with said pin when advanced by a longitudinal movement of the shaft 68. This shaft is conveniently moved by the carriage at a predetermined time by means of a lug, as 74, on the cross-tie 29 of the carriage and a collar, as 80, fixed to the shaft in the path of travel of the lug.

Upon the tape 66 is adjustably fixed a button 79, which is adapted to automatically trip the catch 52, Fig. 4, after a predetermined portion of the tape has been taken up on the reel relative to the desired length of travel of the carriage *a*. This is conveniently accomplished by passing the tape through a suitable slot in the arm 75, so that the button will come in contact therewith, and thereby effect automatic release of the carriage for retraction as the gravity device *F* is set and irrespective the contact of said arm and crank, when the spring 70 will retract the shaft 68 and disconnect the clutch between the pulley 64 and the reel, permitting the gravity of the weight 11 to actuate the tablet-carrier during the return of the carriage to initial position.

The character *I* refers to a suitable indicator by which the relative position to the reproducer of any one of a predetermined number of a tablet is disclosed. This indicator comprises a suitable rotatable dial *e*, preferably located exterior the case *E* and fixed to a suitable axle extending into the case and carrying a sprocket-wheel, as *t*, which is operatively involved with the movements of the tablet-carrier by means of a chain *t'* and a suitable sprocket-pinion *t''*, fixed to the shaft 14. Over the face of the dial is a cover *k*, having a suitable aperture to display characters placed on the face of the dial, each character indicating an individual tablet and being placed relatively to the position of the tablet on the carrier to indicate when displayed that the tablet designated is in cooperative relation with the reproducer.

An operation of the instrument occurs substantially as follows: The desired number of tablets for inscription or transcription are first selected and the carrier adjusted to include corresponding mandrels therefor and then operatively engaged with the mount, which is then rotated to cause a selected tablet to lie in cooperative relation with the reproducer and the gear of the respective tablet to engage with the driving mechanism. Granting initial position of the carriage *a*, power is applied to actuate the drivers 27 and pulley 64, whereupon the selected tablet and the driver-screw 30 will be caused to simultaneously rotate and the crank 71 to revolve. The angle-lever 47 will be likewise actuated by the revolving stud 48, and thereby made to raise the bar 40, which in turn actuates the cam to force the part-nut to engage the

drive-screw and likewise permit the reproducer to drop and engage with the rotating tablet, while the screw simultaneously drives the carriage to traverse the reproducer thereacross, as in any ordinary instrument of this class. As the reproducer approaches the termination of its productive travel the carriage shifts the shaft 68 to engage the clutch between the pulley 64 and the reel, which in turn winds the tape to set the gravity device until the button 79 trips the catch 52. The bar 40 is then lowered, disengages the part-nut from the screw, and also raises the reproducer, whereupon the weighted cord 45 retracts the carriage and the spring 70 acts to disengage the clutch on the wheel. After this the gravity device is free to act to replace the tablet, followed by a succeeding productive travel of the reproducer occurring as before.

From the above description it will be understood that the instrument operates automatically throughout and is continuously productive during application of driving power in accordance with the multiplicity of tablets involved with the carrier, which can be extended at will by introducing additional units. This carrier can also be divided into sections including a predetermined number of units, which sections are contained in the instrument either singly or collectively.

If desired, the instrument is rendered automatically operative for repeated transcription of the same tablet by shifting the weight 83 to hold the pawl 17 from the ratchet 16, in which event the gravity device fails to act to impel the carrier upon the return of the carriage.

By the term "reproducer," which I employ for brevity, I mean any device suitable for transmitting sound-waves to or from a tablet.

From the foregoing it will be understood that the tablet-carrier is conveniently impelled by a motor acting independently of the mechanism for driving the reproducer and relative tablet and that said motor is set for action by a force applied auxiliary to the force impelling said driving mechanism, thereby insuring steadiness of movement in the productive travels of the said reproducer and tablet, and thus rendering the instrument more perfect in operation.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tablet-carrier for use in phonographs and the like, said carrier being composed of sections detachably connected, and means upon said sections for supporting said tablets.

2. A tablet-carrier for use in phonographs and the like, said carrier comprising a flexible belt composed of detachable sections, and means on said sections for carrying tablets.

3. In a carrier mechanism for use in phonographs and the like, a rotatable mount, an idler adjustably related thereto, an extensi-

ble belt engaging said mount and idler, means on the belt to support tablets, and a driver for said belt.

4. In an instrument of the nature indicated; the combination with a reproducer and driving mechanism; of a rotatable mount fixed in relation to said reproducer, an idler adjustable with relation to the mount, and a belt composed of detachable units having means for carrying tablets fixed thereto.

5. The combination with a case and a multiple-tablet carrier; of a movable indicator mounted independently of the said carrier, and driving connection between said indicator and said carrier.

6. The combination with a case and a rotatable multiple-tablet carrier; of a rotatable dial, a cover thereover having an aperture to display one of a series of characters on the dial, a wheel fixed to the axis of said dial, a second wheel fixed to the axis of the carrier, and a belt.

7. In an instrument of the nature indicated; the combination with a reciprocatory reproducer-carriage, a rotary multiple-tablet carrier and driving mechanism; of a gravity-motor operatively connected to said carrier, intermittently-operative clutch mechanism to set the motor and driven by a force auxiliary to the force impelling said driving mechanism, means operative by said carriage during productive travel to coöperatively connect said clutch mechanism, and means operative by said auxiliary force to release said carriage from the driving mechanism.

8. The combination with a movable tablet-carrier; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as the crank operates in one direction, and means whereby said crank is impelled against gravity.

9. The combination with a movable tablet-carrier; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as gravity impels the crank, means by which said crank is advanced against gravity, and means to secure said carrier from movement during advancement of the pawl.

10. The combination with a rotatable mount; of a ratchet operatively related thereto, a gravity bell-crank, a pawl pivoted to the crank to engage the ratchet as gravity impels the crank, means by which said crank is advanced against gravity, a dog securing the ratchet from movement by said advance, a second dog likewise holding said ratchet from moving in the opposite direction and adapted to be tripped by said crank during advance.

11. The combination with a frame, a carriage and a drive-screw; of a reproducer pivoted to said carriage and having a stem, a laterally-reciprocative bar mounted on said

frame in line with the travel of said carriage, and engaging said stem, a part-nut pivoted to said carriage in coöperative relation with said screw having a stem slidably engaging the bar, and a cam operatively related to the said nut and having a stem also engaged with said bar.

12. In an instrument of the nature indicated; the combination with a frame, a reciprocative carriage, a drive-screw, and a part-nut on the carriage to operatively engage with said screw; of an angle-lever pivoted on said carriage and operatively coupled to said screw-engaging means, and a rotatable wheel pivoted to the frame and carrying a stud eccentrically to operate said lever.

13. In an instrument of the nature indicated; a movable tablet-carrier, a gravity-motor operatively connected thereto, a reel, a tape fixed to said reel and having connection with a member of said motor for moving said member to set said motor as said tape is wound upon said reel, and means for winding said reel.

14. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to drive said reproducer and relative tablet, a gravity-motor operatively connected to the carrier, a reel, a tape fixed to a member of the motor for setting same and to the reel, and means operative by the tape as it is taken up on the reel to release the reproducer from said driving mechanism.

15. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to drive said reproducer and relative tablet, a gravity-motor operatively connected to said carrier, a reel, clutch mechanism to operate said reel intermittently, a tape fixed to a member for setting said motor and to the reel, and means operative by said driving mechanism to throw in said clutch mechanism.

16. In an instrument of the nature indicated; a reciprocatory reproducer, a movable multiple-tablet carrier, mechanism to drive said reproducer and relative tablet, a gravity-motor operatively connected to said carrier, a reel, clutch mechanism to operate said reel intermittently, a tape fixed to a member for setting said motor and to the reel, means operative by said driving mechanism to throw in said clutch mechanism, and mechanism operative by said tape as it is taken up on the reel to release the reproducer from said driving mechanism.

Signed by me at Seattle, Washington, this 29th day of January, 1901.

EUGENE JOSEPH ROMANO.

Witnesses:

JOHN KELLEHER,
ROBT. E. WENZEL.

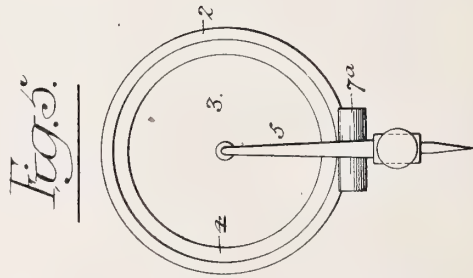
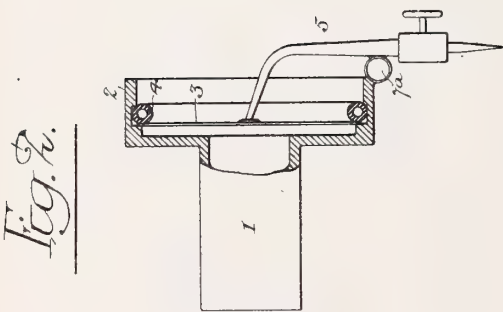
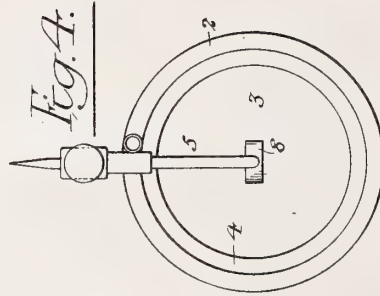
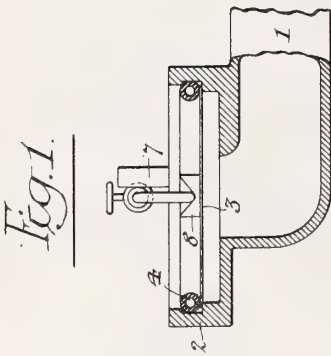
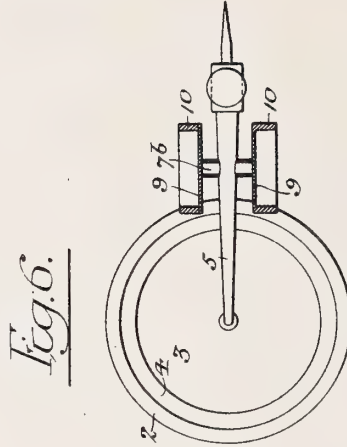
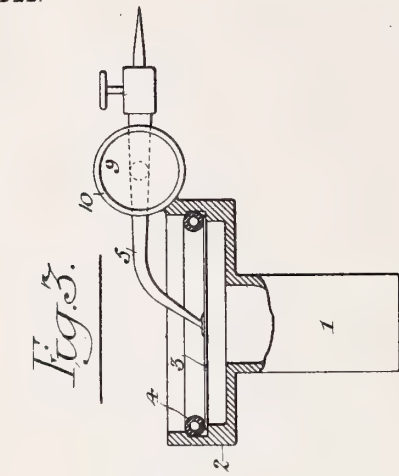
230 109

No. 730,109.

PATENTED JUNE 2, 1903.

E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JULY 29, 1902.

NO MODEL.



Witnesses:-

Frank A. Graham.
Chas. De Lou.

Inventor:-

Edward D. Gleason.

by his Attorneys:-

Howson & Howson

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
ELLSWORTH A. HAWTHORNE AND HORACE SHEBLE, OF PHILADELPHIA,
PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 730,109, dated June 2, 1903.

Application filed July 29, 1902. Serial No. 117,495. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented
5 Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

One object of my invention is to provide a simple and efficient form of elastic mounting
10 for the stylus-lever of the sound-box; and another object is to provide for the action of the stylus-lever upon the diaphragm by movement of said stylus-lever in the plane of the diaphragm instead of in a plane at right angles thereto, as usual. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional view of a sound-box
20 constructed in accordance with my invention. Figs. 2 and 3 are sectional views of other forms of sound-box embodying some of the features of my invention; and Figs. 4, 5, and 6 are face views, respectively, of the sound-
25 boxes shown in Figs. 1, 2, and 3.

1 represents the tubular stem of the sound-box, and 2 the enlarged or cup-shaped portion of the same, which receives the diaphragm 3, the latter being mounted in this
30 portion of the sound-box in any available manner. In the present instance the diaphragm rests upon an internal annular shoulder and is retained in position thereon by an elastic ring 4, engaging an internal annular
35 groove in the casing.

The stylus-lever 5 is secured to one side of a tube 7, projecting outwardly from the rim of the casing 2 at one side of the same, so
40 that vibrations of the lever under the action of the walls of the undulating groove of the record upon the stylus 6 will cause torsional strain upon the tube 7. Hence the tendency of the latter is to maintain the stylus-lever
45 constantly in a neutral intermediate position and to restore it to this position when it is vibrated in either direction therefrom.

The stylus-lever in the sound-box shown in Figs. 1 and 4 vibrates in a plane parallel with
50 the diaphragm, and in order that this move-

ment may cause the desired vibrations of the diaphragm the latter is provided with a duplex wedge-block 8, engaging with the bent inner end of the stylus-lever, as shown in Fig. 1, said lever when in this normal or neutral position being centrally disposed between the
55 wedges, but when moved in either direction from this central position acting upon one or other of the wedges, so as to cause vibration of the diaphragm to an extent dependent upon
60 the extent of this lateral deflection.

My improved method of mounting the stylus-lever may, however, be adopted in that class of sound-boxes in which the stylus-lever vibrates in a plane at right angles to the plane
65 of the diaphragm and acts directly upon the latter, Figs. 2 and 3 illustrating two different embodiments of my invention as applied to that type of sound-box.

In the construction shown in Fig. 2 the
70 stylus-lever is connected to a tube 7^a, which is secured to the sound-box casing 2, and in the construction shown in Fig. 3 the stylus-lever is secured to a tube 7^b, which instead of being connected directly to the sound-box
75 casing 2 is connected at its opposite ends to diaphragms 9, carried by short tubes or rings 10, secured to said casing 2.

It will be observed that in the different forms shown the tube has a different axis
80 from that of the stylus.

A tubular mounting of the character described absorbs to a considerable extent those tremors or infinitesimal vibrations imparted to the stylus-lever by reason of the scraping
85 or scratching of the stylus against the walls of the undulatory grooves of the record. Hence the vibrations of the diaphragms correspond more closely than in constructions employing solid bars or strips to the actual
90 vibrations represented by the undulatory grooves, and the reproduction is consequently sharp and clear.

Having thus described my invention, I claim and desire to secure by Letters Pat-
95 ent—

1. A talking-machine sound-box having a diaphragm, a casing therefor, and a stylus-lever mounted upon said casing through the medium of an interposed tube whose axis is
100

different from the axis of the stylus, substantially as specified.

2. A talking-machine sound-box having a diaphragm, a casing therefor, and a stylus-lever mounted upon said casing through the medium of a tube to whose peripheral portion the stylus-lever is directly secured, substantially as specified.

3. A talking-machine sound-box having a diaphragm, a casing therefor, a stylus-lever mounted so as to vibrate in a plane parallel to the plane of the diaphragm, and a wedge-block through the medium of which the stylus-lever acts upon the diaphragm, substantially as specified.

4. A talking-machine sound-box having a diaphragm, a casing therefor, a stylus-lever mounted so as to vibrate in a plane parallel to the plane of the diaphragm, and a duplex wedge-block through the medium of which the stylus-lever acts upon the diaphragm, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD D. GLEASON.

Witnesses:

F. E. BECHTOLD,
JOS. H. KLEIN.

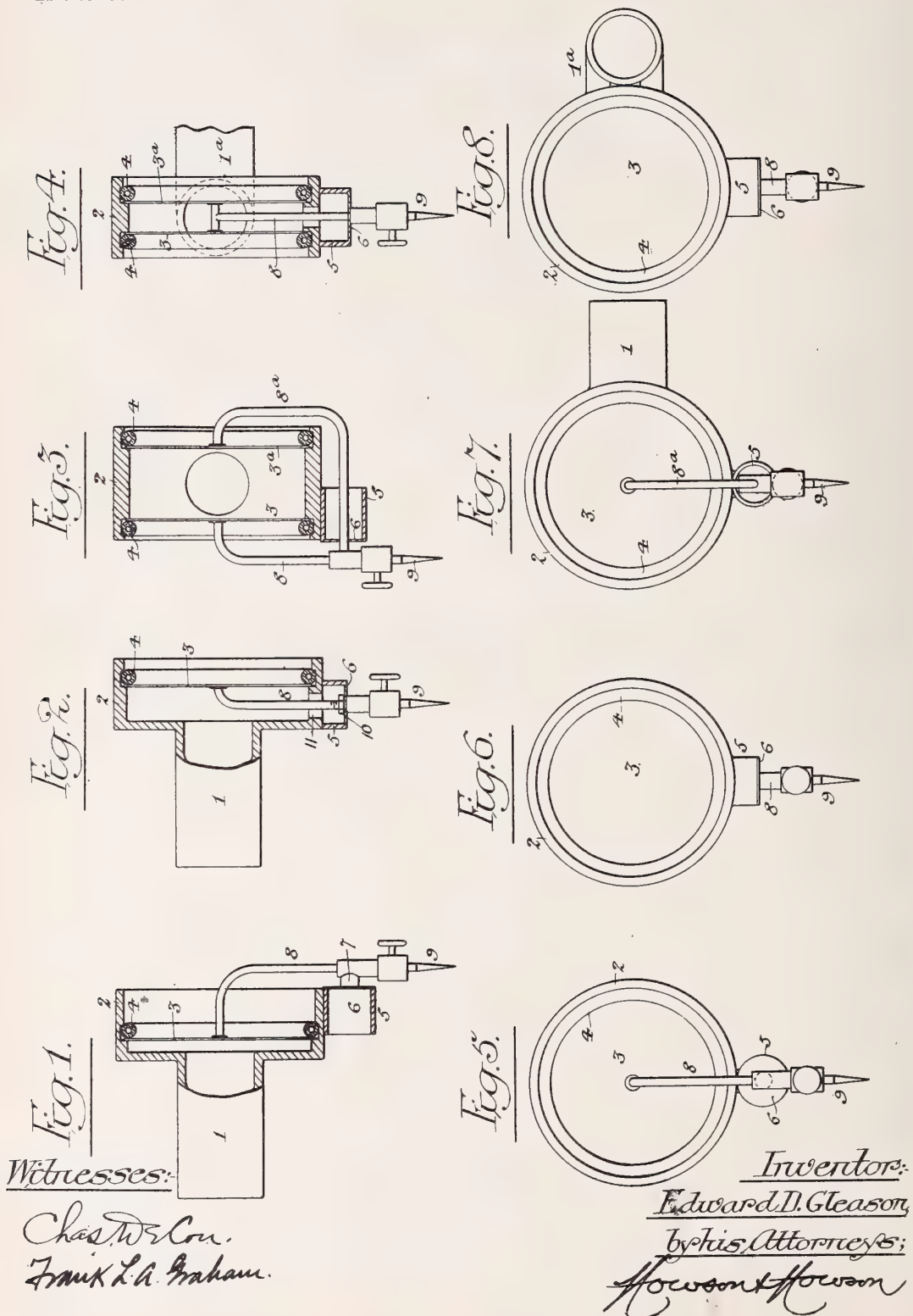
No. 730,110.

PATENTED JUNE 2, 1903.

E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED JULY 30, 1902.

NO MODEL.



UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
ELLSWORTH A. HAWTHORNE AND HORACE SHEBLE, OF PHILADELPHIA,
PENNSYLVANIA.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 730,110, dated June 2, 1903.

Application filed July 30, 1902. Serial No. 117,703. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented
5 certain Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

The objects of my invention are to provide a simple and inexpensive form of elastic
10 mounting for the stylus-arm of a sound-box, to amplify the sound by the employment of a plurality of diaphragms instead of the single diaphragm ordinarily used, and to provide a more compact sound-box structure than
15 those heretofore made. These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional view of a single-dia-
20 phragm sound-box constructed in accordance with my invention. Fig. 2 is a similar view illustrating a different location of stylus-lever constituting one of the features of the invention. Figs. 3 and 4 are sections of double-
25 diaphragm sound-boxes constructed in accordance with the invention, and Figs. 5, 6, 7, and 8 are front views of the sound-boxes shown in Figs. 1, 2, 3, and 4, respectively.

The sound-box consists of a tubular stem
30 1, with enlarged or cup-shaped end 2, containing the diaphragm 3, which may be mounted in the casing of the sound-box in any suitable manner, the diaphragm in the present instance being seated upon an internal annular shoulder formed in the enlarged portion
35 2 of the sound-box and being retained in position thereon by means of an elastic ring 4, inserted into an annular groove in the inner face of said portion 2 of the box.

Suitably secured to the outer face of the
40 sound-box shown in Fig. 1 is a short tube 5, the top of which is closed by a thin diaphragm 6, which may be an integral part of the tube 5 or may be a separate piece brazed or otherwise suitably secured to said tube. Projecting
45 outwardly from the center of this diaphragm 6 is a post 7, which carries the stylus-lever 8 of the instrument, the latter being curved downwardly at the inner end, so as

to bear upon the central portion of the dia- 50
phragm 3, to which, if desired, it may be suitably secured, the outer end of the stylus-lever having detachably secured therein the stylus 9, which engages with the walls of the
55 waved or undulating groove of the record and is vibrated thereby, this vibration being transmitted through the stylus-lever to the diaphragm 3 in order to cause the vibrations of the latter, whereby the sound-waves are re-
60 produced.

The thin diaphragm 6 provides a mounting for the stylus-lever, which is sufficiently elastic or resilient to permit ready vibration of the same, but which eliminates all loose joints or points of contact between the stylus-lever
65 and sound-box casing, said stylus-lever and its mount in my improved sound-box being substantially one part, so that any chatter or vibration due to loosely-fitting joints or points
70 of bearing between the stylus-lever and casing is effectually prevented.

In that form of sound-box shown in Fig. 2 the tube 5 and its diaphragm 6 are disposed upon the sound-box casing in a manner different from that represented in Fig. 1, and
75 the stylus in this case passes through a central opening in the diaphragm, to which the stylus-lever may be secured by brazing, soldering, or by other means, one of such other means being the reduction in the size of the
80 stylus-lever, so as to form a shoulder bearing against the outer face of the diaphragm, the reduced portion of the lever being threaded for the reception of a nut 10, which bears upon the inner face of the diaphragm and
85 serves to securely confine the stylus-lever thereto. In this form of my improved sound-box, moreover, the stylus-lever is located on the inner side of the diaphragm instead of upon the outer side of the same, as usual,
90 the sound-box casing having in one side an opening 11 for the passage of the stylus-lever. By this means the sound-box structure is rendered compact, and the stylus-lever is protected by the sound-box casing, so that it
95 is not liable to injury.

In order to amplify the sound, I prefer in some cases to use a sound-box having a dou-

ble diaphragm, and in Figs. 3 and 4 I have shown two different forms of such a sound-box, that shown in Fig. 3 having outside stylus-levers and that shown in Fig. 4 having an inside stylus-lever.

In the structure shown in Fig. 3 the mounting of the stylus-lever 8 is substantially similar to that shown in Fig. 1; but the diaphragm 6 is perforated and the post 7 is continued through the same and through the tube 5 in the form of a supplementary stylus-lever 8^a, which bears upon the diaphragm 3^a, the latter being opposed to the diaphragm 3, upon which the stylus-lever 8 bears, and the tubular stem 1 of the sound-box projects laterally from the casing 2, so as to communicate with the chamber between the two diaphragms.

In the double-diaphragm box (shown in Fig. 4) the stylus-lever is mounted in the same manner as in Fig. 2, but it has a T-shaped inner end, one arm of the T bearing against the diaphragm 3 and the other against the diaphragm 3^a. In this sound-box, also, an elbow-tube 1^a replaces the straight tubes of the sound-boxes previously described, the object being to provide a horn-attaching portion projecting at right angles to the diaphragm, while at the same time retaining the lateral communication with the sound-chamber necessitated by the use of the two diaphragms.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A sound-box for talking-machines in which are combined a casing, a diaphragm mounted therein, a tube projecting from said casing, and also carrying a diaphragm, and a stylus-lever mounted upon the latter diaphragm, substantially as specified.

2. A talking-machine sound-box having a

casing containing a diaphragm, a stylus-lever bearing upon the inner face of said diaphragm, and projecting laterally through the casing, and a tube surrounding said stylus-lever and carrying a diaphragm upon which the same is mounted, substantially as specified.

3. A talking-machine sound-box having a plurality of diaphragms, a duplex stylus-lever having a stylus-lever and a bearing upon each of said diaphragms, a tube projecting from said sound-box, and a diaphragm closing the end of said tube and providing an elastic support for the stylus-lever, substantially as specified.

4. A talking-machine sound-box having a plurality of diaphragms, a duplex stylus-lever having a single stylus and a bearing upon the inner face of each of said diaphragms, a tube projecting from the sound-box and surrounding the stylus-lever, and a diaphragm closing the end of said tube and providing an elastic mounting for said stylus-lever, substantially as specified.

5. A talking-machine sound-box having a plurality of diaphragms each exposed upon its outer face, a tubular stem projecting laterally from the sound-box and communicating with the chamber between the two diaphragms, and a duplex stylus-lever having a single stylus and a positive connection with each of said diaphragms, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD D. GLEASON.

Witnesses:

F. E. BECHTOLD,

JOS. H. KLEIN.

730,986

Tainder

C. S. TAITER.
GRAPHOPHONE.

APPLICATION FILED DEC. 29, 1902.

NO MODEL.

4 SHEETS—SHEET 1.

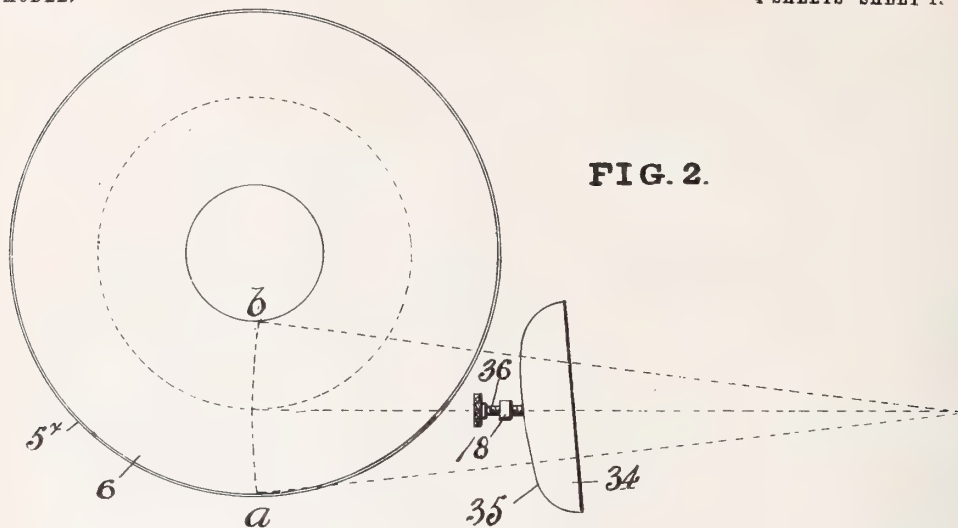


FIG. 2.

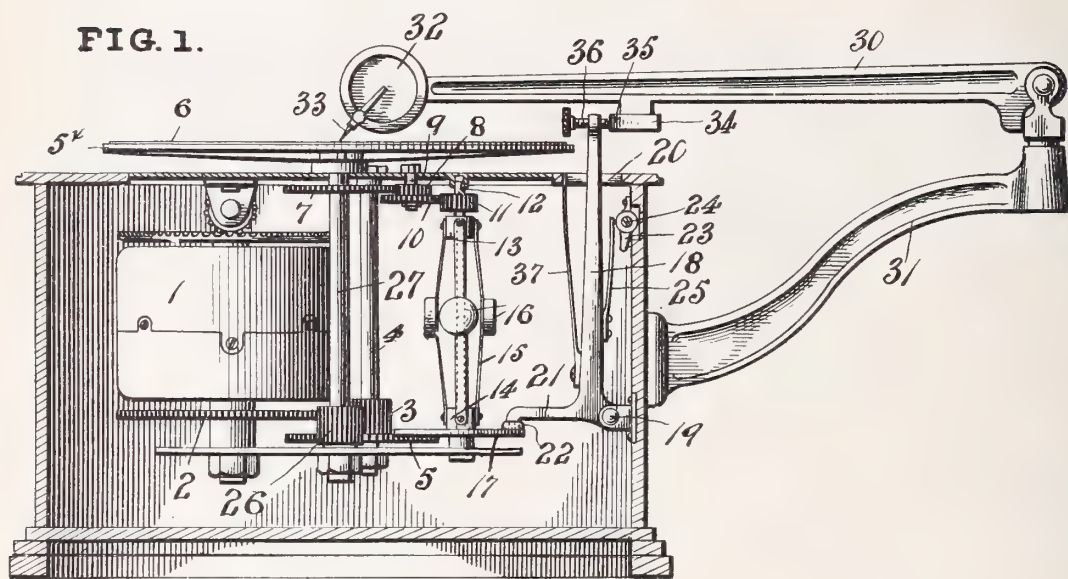


FIG. 1.

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Charles S. Taiter

Witnesses

Chas. K. Davies.

[Signature]

By

Thayer Davis

Attorney

C. S. TAINTER.
GRAPHOPHONE.

APPLICATION FILED DEC. 29, 1902.

NO MODEL.

4 SHEETS—SHEET 2.

FIG. 3.

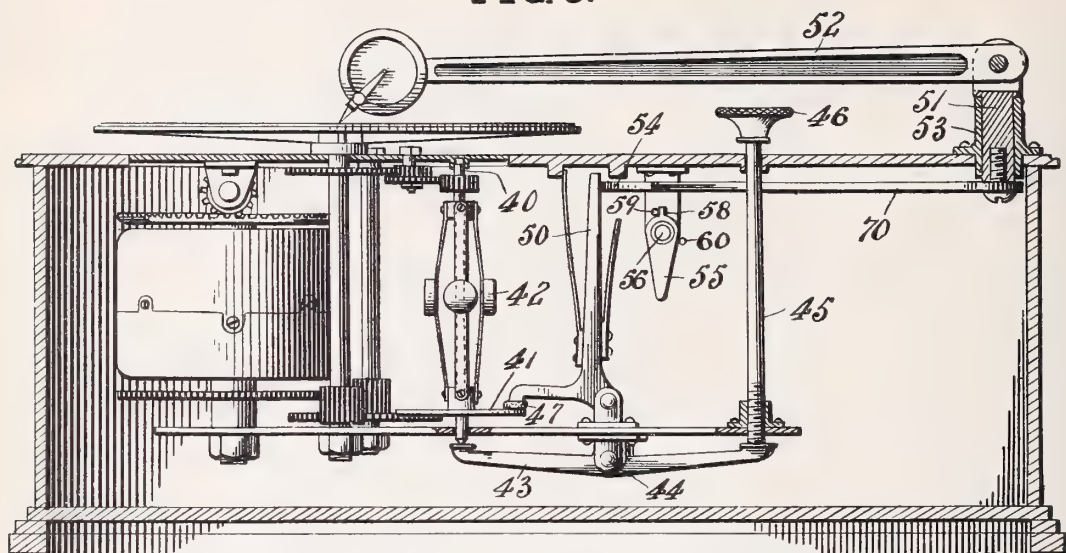


FIG. 4.

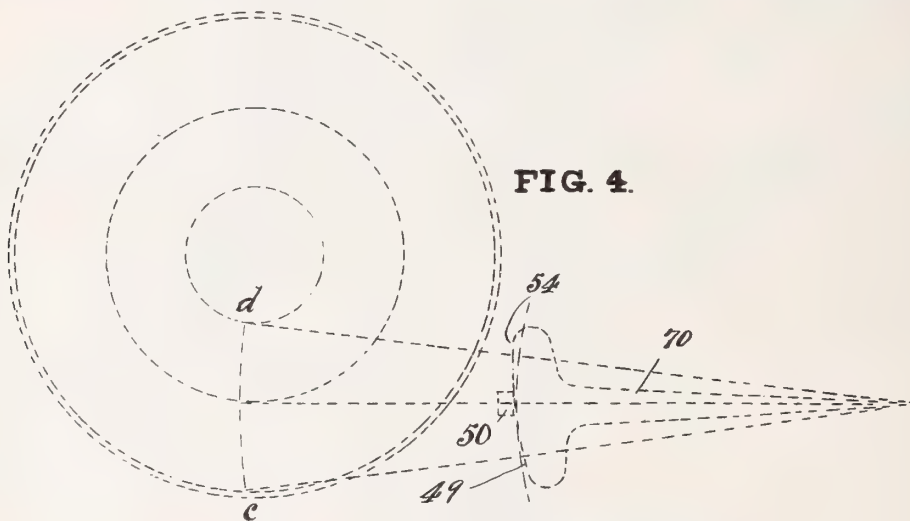
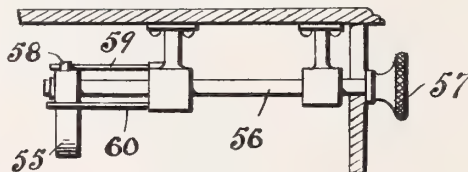


FIG. 5.



Inventor

Charles S. Tainter

Witnesses

Chas. A. Davis.
J. W. Lewis

By

Thompson
Attorney

C. S. TAINTER.
GRAPHOPHONE.

APPLICATION FILED DEC. 29, 1902.

NO MODEL.

4 SHEETS—SHEET 3.

FIG. 7.

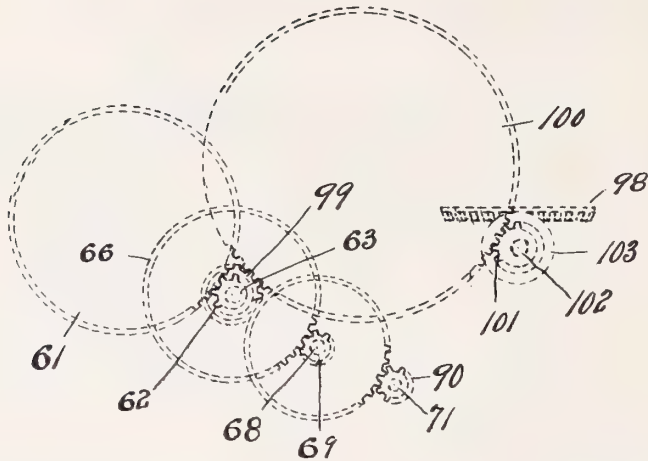
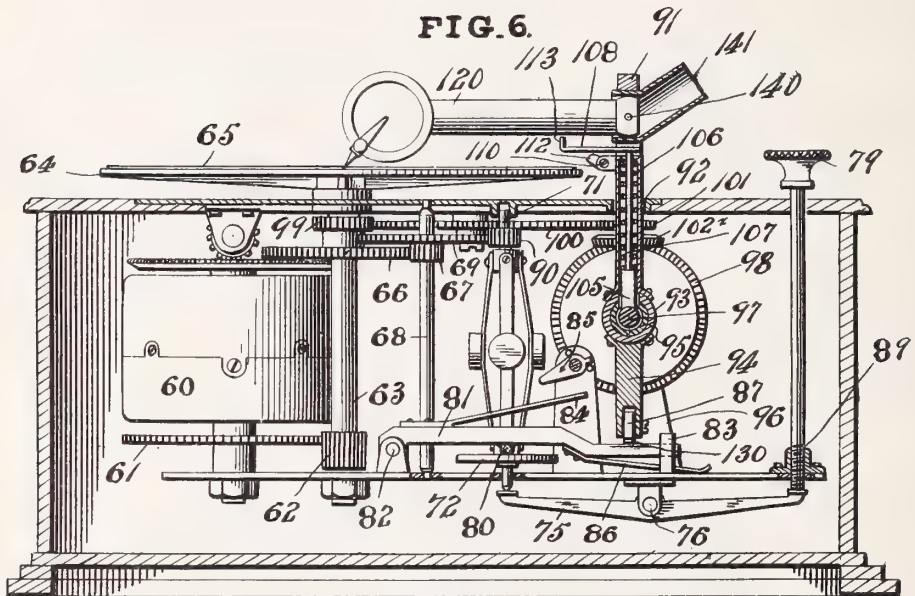


FIG. 6.



WITNESSES:

Chas. K. Davis.

INVENTOR

Charles S. Tainter

By

Attorney



C. S. TANTER.
GRAPHOPHONE.

APPLICATION FILED DEC. 29, 1902.

NO MODEL.

4 SHEETS—SHEET 4.

FIG. 9.

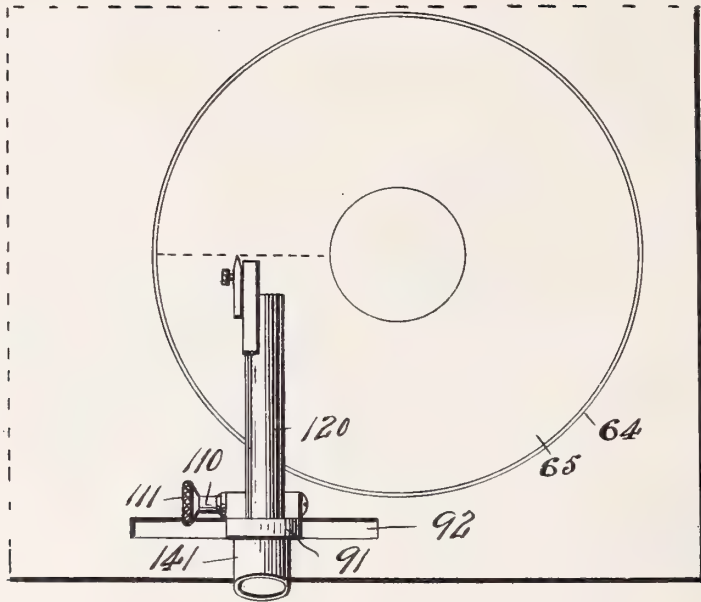
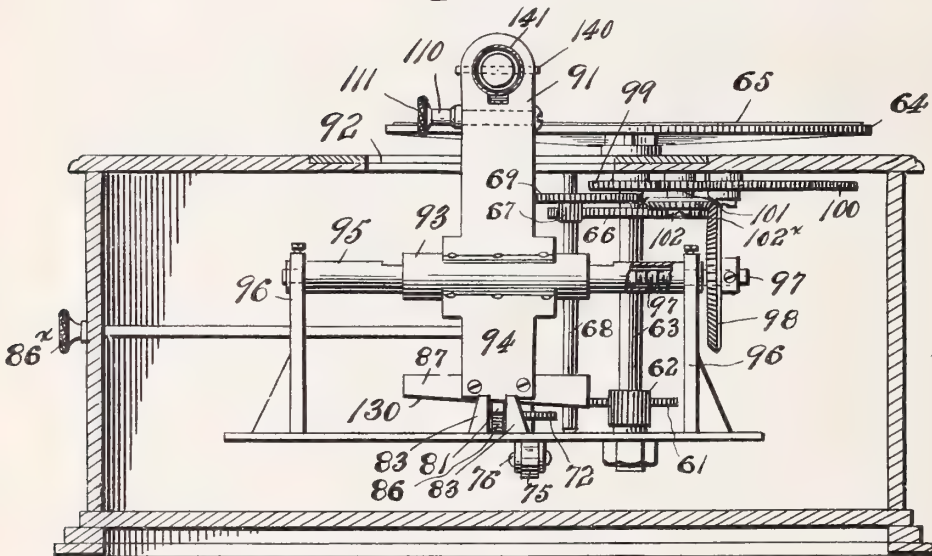


FIG. 8.



WITNESSES:

Chas. K. Davis.

[Signature]

INVENTOR

Charles S. Tainter

By

[Signature]

Attorney

UNITED STATES PATENT OFFICE.

CHARLES S. TAINTER, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT
OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

GRAPHOPHONE.

SPECIFICATION forming part of Letters Patent No. 730,986, dated June 16, 1903.

Application filed December 29, 1902. Serial No. 137,024. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. TAINTER, of Washington, District of Columbia, have invented a new and useful Improvement in Graphophones, which invention is fully set forth in the following specification.

In talking-machines now commonly used, wherein the record of sound is made on a disk tablet, it is customary to rotate the tablet at a uniform speed, the desired uniformity being attained by suitable speed-regulating means associated with the driving-motor. The record, usually in the form of a groove, is formed on the face of the disk tablet in a volute or spiral commencing at the outer edge of the disk, where the speed of movement of the surface is greatest, and extending toward the center, where the speed of movement is least. It follows that the surface of the tablet at or near its outer edge will travel under a recording or reproducing stylus at much greater speed than the surface near the center of the tablet, the speed gradually decreasing as the recording or reproducing stylus moves toward the center of rotation. In other words, the record-disk will travel under the recorder or reproducer at a constantly-varying surface speed. In Patent No. 341,214, of May 4, 1886, to Bell and Tainter, we referred to advantages to be gained by giving the rotating record-disk a uniform surface speed under the recorder or reproducer and illustrated and described therein means for imparting the desired speed of rotation through a friction-wheel bearing against the under or rear side of a plate upon which the tablet rests, relative transverse movement being imparted to the friction-wheel and plate to cause said wheel to operate against the plate at a point directly opposite or under the recorder or reproducer bearing upon the tablet-surface. Similar means were shown and described in my Patent No. 385,886, of July 10, 1888; but this manner of rotating the tablet presents difficulties and objections, principally the necessity of relative transverse movement between the supporting-plate and friction-wheel, wherefore it has never, so far as I am aware, been commercially used to any

material extent and could not be successfully applied to machines now upon the market.

According to my present invention I attain the desired uniformity of surface speed under the recorder or reproducer by providing means for automatically and gradually varying or changing the speed of the driving-motor to compensate for the constantly-changing position of the recorder or reproducer on the tablet-surface. As applied, for example, to the commercial disk form of machine employing disk tablets, wherein the volute sound-groove commences at the outer edge of the record-surface and extends toward the center, the means employed according to my invention act to gradually increase the speed of the motor. Should the record of sound extend in the opposite direction, the speed of the motor would be gradually decreased.

While my invention is herein shown and described principally with reference to machines employing flat disk records having the record formed on the face thereof in a simple volute or spiral, it is apparently applicable to machines employing any form of record-tablet the surface of which is not at all points at the same distance from the axis of rotation, or, in other words, employing a tablet wherein a sound-record formed thereon gradually becomes throughout its length more distant from or nearer to the axis of rotation. For example, it is applicable to machines employing tablets having concave, convex, conical, frusto-conical, or spherical surfaces on which the record is formed in a helico-volute.

The volume of sound reproduced from disk records with machines now commonly used gradually diminishes from the commencement to the end of the reproduction. This is due to the gradual diminution in surface speed as the reproducer moves toward the axis of rotation of the disk tablet. This diminution in volume, which is always more or less objectionable, is overcome by driving the record-disk at a uniform speed under the reproducer. Furthermore, as stated in Patent No. 341,214, referred to, by giving to the disk a uniform surface speed under the recorder

or by making the times of each rotation inversely proportional to the distance of the recorder from the center of the disk, the record of any given word or sound will be of the same length at whatever part of the disk it may be, and in this way it is possible to considerably increase the number of words or sounds on a given area.

As will be apparent, my invention is capable of many mechanical embodiments, several of which are shown in the accompanying drawings and will now be explained in detail to show how the invention is or may be applied.

Figure 1 is a view showing the casing in vertical section and the mechanism in elevation. Fig. 2 is a diagrammatic view showing the relative position of the speed-controlling cam and the lever actuated thereby when the reproducer has traversed about half the distance from the outer edge to the inner edge of the record. Figs. 3 and 4 are views similar to Figs. 1 and 2 of another embodiment of the invention. Fig. 5 is a detail of parts shown in Fig. 3. Figs. 6, 7, 8, and 9 show still another embodiment of the invention, Figs. 6 and 8 being views at right angles to each other, showing the casing in vertical section and the mechanism in elevation, Fig. 7 a diagrammatic view of the gearing employed for driving various parts, and Fig. 9 a top plan view, only part of the casing of the machine being shown.

Referring to Figs. 1 and 2, 1 is a drum inclosing the usual motor-spring for driving gear-wheel 2, which in turn meshes with pinion 3 on shaft 4. Gear 5 on shaft 4 meshes with pinion 26 on shaft 27, which projects at its upper end through the top of the casing and carries turn-table or plate 5^x, upon which the disk record-tablet 6 rests. A gear-wheel 7 at the upper end of shaft 27 meshes with a pinion 8 on the spindle 9, and gear 10 on said spindle meshes with pinion 11 on the governor-shaft 12. The governor, which is of the usual centrifugal friction type, comprises a collar 13, secured to shaft 12, said collar being connected with a second collar 14, free to move longitudinally on the shaft by spring-blades 15, each of which carries at its middle a weight 16.

17 is a friction-disk secured to or formed integral with collar 14 and adapted to be more or less elevated as the speed of the motor increases and the weights fly out by centrifugal action. The mechanism as thus far described is old and well known.

18 is a lever fulcrumed at 19 in a bracket secured to the inner surface of the casing, said lever extending upwardly through an opening 20 in the top plate of the casing. An arm 21 on the lever overhangs the edge of friction-plate 17 and carries a friction pad or stud 22, of leather, cork, or similar material, adapted to bear upon the surface of said disk as it rotates, and thereby control the speed of the motor.

23 is a starting and stopping device, consisting in this instance of an arm 23, carried by a spindle 24, which is mounted on a bearing secured to the inner face of the casing and projects at one end to the outside of the casing, where it is provided with a suitable thumb-nut, such as shown in Fig. 5. As shown in Fig. 1, the arm 23 is in position to permit the motor to run. To stop the motor, the shaft 24 is rotated by its thumb-nut to bring the arm 23 in a horizontal position, causing its outer end to bear upon the spring 25, secured to and extending along the side of lever 18, thereby moving the upper end of said lever to the left, Fig. 1, and forcing the friction-pad 22 down against the friction-disk 17 with such force as to completely stop the motor mechanism.

30 is a swinging arm swiveled at its outer end in the usual manner in a bracket 31, secured to the side of the casing.

32 is a reproducer carried at the free end of the said arm and provided with stylus 33, which rests upon the record-tablet 6.

34 is a plate secured to the under side of swinging arm 30, having its edge 33 disposed at an incline or obliquely to said arm. The end of a thumb-screw 36, passing through the upper end of lever 18, bears upon and is held in engagement with the edge 35 of plate 34 by the action of a spring 37, which constantly tends to force the upper end of the lever 18 to the right, Fig. 1. The tension of said spring 37 is, however, easily overcome in operating the starting and stopping device. As more clearly shown in Fig. 2, the edge 35 of the plate 34 is cam-shaped and adapted to so operate in conjunction with lever 18 as to gradually raise the friction-pad 22 as the reproducer travels from the outer edge of the record-tablet toward the center thereof along the line *a b*, Fig. 2, thereby permitting the speed of the motor to gradually increase to produce a uniform surface speed under the reproducer.

It will be understood that the shape and disposition of the acting surface of plate 34 may be so determined as to obtain this uniformity of surface speed under the reproducer with great accuracy. By turning the screw 36 the position of the friction-pad 22 may be changed (irrespective of the action of the cam) for the purpose of increasing or decreasing the initial speed of the motor, this adjustment of course in no way interfering with the operation of the cam or inclined surface in producing the desired uniformity of speed under the reproducer.

In the modified construction shown in Figs. 3, 4, and 5 the governor-shaft 40, on which the friction-disk 41 is adapted to be moved in a vertical direction by the weights 42 under the influence of centrifugal action, rests at its lower end in a bearing at one end of a rocker-arm 43, fulcrumed at 44. A screw 45, extending downwardly through the top of the casing, carries at its upper end a milled

head 46 and at its lower end passes through part of the motor-frame and bears on the other end of the rocker-arm 43, swinging said arm on its fulcrum and moving the shaft 40 longitudinally to raise or lower the same, causing the disk 41 to engage the friction-pad 47 at a lower or higher speed of the motor, whereby the initial speed of the motor may be adjusted without interfering with the automatic control of said speed, about to be explained. In the embodiment of the invention shown in these figures (Figs. 3, 4, and 5) the swivel-pin 51, on which the swinging arm 52 of the machine turns, projects downwardly through a bearing 53 into the casing. An arm or plate 70 within the casing is secured to the lower end of said pin, and therefore receives a swinging movement in a horizontal plane exactly corresponding to the swinging movement of arm 52. At its free extremity arm 70 has an inclined or cam-shaped edge or surface 54, against which the upper end of arm 50 bears, said edge being so disposed and shaped as to actuate the lever to gradually raise the friction-pad as the reproducer travels from the outer edge of the record-disk toward the inner edge thereof along the line *cd*, Fig. 4, thereby permitting the speed of the motor to gradually increase. The shape of the inclined or cam-shaped edge may, as before stated, be so determined as to produce an accurate uniformity of speed under the reproducer. The starting and stopping device 55 shown in Figs. 3 and 5 operates in the same manner as that shown in Figs. 1 and 2. It is carried by a shaft 56, adapted to be rotated by a milled head 57. A lug 58 on arm 55 engages pins 59 and 60 to limit the movement of the arm.

In the construction shown in Figs. 6, 7, 8, and 9 instead of employing an arm for the recorder or reproducer arranged to swing on a swivel-pin as it is fed by the grooved record-tablet, as in other figures of the drawings, mechanism is provided for feeding the arm carrying the recorder or reproducer independently of the record-tablet. 60 is a drum containing the motor-spring, as before, and driving a gear 61, meshing with pinion 62 on shaft 63, which projects at its upper end through the top of the casing and carries the turn-table or plate 64, upon which the record-disk 65 rests. A gear-wheel 66 on shaft 63 meshes with pinion 67 on shaft 68, and a gear 69 on said shaft meshes with a pinion 90 on the governor-shaft 71. The governor-shaft is provided with a friction-disk 72, adapted to be moved vertically thereon by the action of weights actuated by centrifugal force, as already described with reference to the other figures. Shaft 71, which is mounted in bearings so as to have slight longitudinal movement, rests at its lower extremity upon one end of rocker-beam 75, fulcrumed at 76, said beam bearing at its other end against the lower extremity of a screw 89, adapted to be turned by milled head 79. Adjustment of

the screw moves the rocker-arm 75 on its fulcrum, so as to slightly raise or lower the governor-shaft 71 and cause the disk 72 to engage friction-pad 80 at a lower or higher speed of the motor, whereby the initial speed of the motor may be adjusted, as already described with reference to Figs. 3, 4, and 5.

81 is a lever fulcrumed at one end at 82 and at its other end working between two guide-lugs 83 83. This lever carries the friction-pad 80, above referred to. A spring 84, projecting upwardly from the upper side of the lever, is adapted to be engaged by the starting and stopping device 85, operated by milled head 86^x, Fig. 8, in the same manner as the starting and stopping device shown in Figs. 3 and 5. A spring 86, secured to the under side of lever 81, tends to force said lever upwardly and hold it in engagement with the lower inclined edge of a plate 87, to be more fully referred to hereinafter.

91 is a carriage extending upwardly through a slot 92 in the top of the casing and comprising at its lower end a sleeve 93 and a depending arm 94, sleeve 93 fitting about tube 95, on which it is free to slide. Sleeve 93 is supported at opposite ends in standards 96 96 and incloses a feed-screw 97, carrying a bevel-gear 98 at one end. The feed-screw is rotated by the motor through pinion 99 on shaft 63, meshing with gear 100, which in turn meshes with pinion 101 on spindle 102. Bevel-gear 102^x on said spindle drives bevel-gear 98, thereby rotating the feed-screw 97. Segmental nut 105, movable vertically in a hollow part of the carriage, is adapted to engage the feed-screw through a slot in the upper side of tube 95, a coiled spring 106 tending to force the nut downwardly into engagement with the feed-screw. A rod 107, extending upwardly from the nut through spring 106, has a horizontal arm 108 at its upper end. A spindle 110, adapted to be rotated in bearings on the carriage by a milled head 111, has a lug 112, adapted to engage under arm 108 and move it upwardly to disengage nut 105 from the feed-screw, so that the carriage can be moved to any desired position. By the same operation the upturned end 113 of arm 108 engages under and lifts the reproducer or recorder arm 120, thereby lifting the stylus of the recorder or reproducer from the record and avoiding injury to these parts when the nut is disengaged from the feed-screw and the carriage free to be moved independently thereof.

Plate 87, before referred to, is rigidly secured to the lower end of arm 94 and of course partakes of the movement imparted to the carriage. The lower edge 130 of said plate is inclined or slanted, so as to have a cam-like action upon the end of lever 81, upon which it bears, gradually depressing said lever to lower the friction-pad 80 should the feed of the machine be from the right to the left, Fig. 8, or permitting spring 86 to gradually raise the lever 81 and the friction-pad 80

if the feed is in the reverse direction. These variations in the position of the friction-pad 80 cause corresponding variations in the motor-speed, thereby producing a uniform surface speed under the recorder or reproducer.

The hollow recorder or reproducer arm 120, through which the sounds are conveyed, is mounted on a horizontal pivot 140 in a tubular socket 141 on carriage 91. The pivotal connection is sufficiently loose to permit slight lateral play of the arm. A horn or mouth-piece may be slipped onto the socket 141.

As will be apparent, my invention is applicable to machines adapted to record, as well as to reproduce, sounds and may be used in the production of records having either perpendicular or lateral undulations corresponding to sound-waves. It may also be used in reproducing from either of these types of records. Furthermore, it will be apparent that the principle of my invention is susceptible of many different mechanical embodiments and is not limited to the particular means herein shown and described.

What is claimed is--

1. In a machine for recording or reproducing sounds, a rotatable tablet having a surface of such form that a record of sound formed thereon along a volute or spiral line will vary in distance from the axis of rotation of the tablet, a recorder or reproducer operating in conjunction with the tablet, motor mechanism for rotating the tablet, and automatically-operating speed-controlling means varying the speed of the motor as the recorder or reproducer moves toward or from the axis of rotation of the tablet.

2. In a machine for recording or reproducing sounds, a rotatable tablet having a surface of such form that a record of sound formed thereon along a volute or spiral line will vary in distance from the axis of rotation of the tablet, a recorder or reproducer operating in conjunction with the tablet, motor mechanism for rotating the tablet, and automatically-operating speed-controlling means varying the speed of the motor to produce approximately uniform surface speed under the recorder or reproducer.

3. The combination with a rotatable tablet having different surface speeds at different points on its surface when rotated at a uniform axial speed, of a recorder or reproducer operating in conjunction with the tablet, motor mechanism for rotating the tablet, and automatically - operating speed - controlling means varying the speed of the motor according to the position of the recorder or reproducer on the surface of the tablet.

4. The combination with a rotatable tablet having different surface speeds at different points on its surface when rotated at a uniform axial speed, of a recorder or reproducer operating in conjunction with the tablet, motor mechanism for rotating the tablet, and automatically - operating speed - controlling means varying the speed of the motor to pro-

duce an approximately uniform surface speed under the recorder or reproducer.

5. In a machine for recording or reproducing sounds, a rotatable tablet having a surface of such form that a record of sound formed thereon along a volute or spiral line will vary in distance from the axis of rotation of the tablet, a recorder or reproducer operating in conjunction with the tablet, motor mechanism for rotating the tablet, and automatically - operating speed - controlling means increasing the speed of the motor as the recorder or reproducer moves toward the axis of rotation of the tablet or vice versa.

6. The combination of a rotatable support for a record-tablet, a motor for rotating said support, and automatically-operated speed-changing mechanism for varying the speed of the motor including a controlling device or part to which movements are imparted corresponding to the movements of the recorder or reproducer in tracking a spiral line on the record-tablet.

7. The combination of a rotatable support for a record-tablet, a motor for rotating said support, a recorder or reproducer, a support or carrier for the recorder or reproducer movable therewith as it tracks a spiral line on the record-tablet, and automatically-operated speed-changing mechanism for varying the speed of the motor including a controlling device or part having connection with the support or carrier and following the movements thereof.

8. The combination of a rotatable support for a record-tablet, a motor for rotating said support, a recorder or reproducer, an automatically-operated speed-changing lever movable to vary the speed of the motor, and a device or part controlling the movement of said lever to which device or part movements are imparted corresponding to the movements of the recorder or reproducer in tracking a spiral line on the record-tablet.

9. The combination of a rotatable support for a record-tablet, a motor for rotating said support, a recorder or reproducer, a support or carrier for the recorder or reproducer movable therewith as it tracks a spiral line on the record-tablet, an automatically-operated speed-changing lever movable to vary the speed of the motor, and a device or part having an inclined or cam-like edge or surface against which the lever bears and by which its movements are controlled said device or part having connection with the support or carrier and following the movements thereof.

10. The combination of a rotatable support for a record-tablet, a motor for rotating the same, a centrifugal frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a friction device bearing against the disk, a recorder or reproducer, and automatically-operated mechanism for changing the position of the friction device thereby varying the speed of the motor.

11. The combination of a rotatable support for a record-tablet, a motor for rotating the same, a centrifugal frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a friction device bearing against the disk and limiting the axial movement thereof, and automatically-operated means for changing the position of the friction device thereby varying the speed of the motor.

12. The combination of a rotatable support for a record-tablet, a motor for rotating the same, a centrifugal frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a friction device bearing against the disk and limiting the axial movement thereof, a lever carrying the friction device and automatically-operated lever-actuating means for moving the lever and changing the position of the friction device thereby varying the speed of the motor.

13. In a machine for recording or reproducing sounds, a rotatable tablet having a surface of such form that a record of sound formed thereon along a volute or spiral line will vary in distance from the axis of rotation of the tablet, a recorder or reproducer operating in conjunction with the tablet, a motor for rotating the tablet, a centrifugal frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a friction device bearing against the disk and limiting the axial movement thereof, and automatically-operating speed-controlling means gradually moving the friction device to permit the speed of the motor to gradually increase as the recorder or reproducer moves toward the axis of rotation of the tablet and vice versa.

14. The combination of a rotatable record-tablet, a motor for rotating the same, a recorder or reproducer operating in conjunction with the tablet, a frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a relatively stationary friction device bearing against the disk and limiting the axial movement thereof, a speed-adjusting device for changing the position of the friction device to determine the initial speed of the motor, and automatically-operating speed - controlling means gradually changing the position of the friction device to gradually vary the speed of the motor.

15. The combination of a rotatable record-tablet, a motor for rotating the same, a recorder or reproducer operating in conjunction with the tablet, a frictional speed-governor for the motor comprising a disk rotated by the motor, centrifugal devices for axially moving the disk and a relatively stationary friction device bearing against the disk and limiting the axial movement thereof, a speed-adjusting device for changing the position of the friction device to determine the initial speed of the motor, a starting and stopping device for forcibly pressing the friction device against the disk to stop the motor, and automatically - operating speed - controlling means gradually changing the position of the friction device to gradually vary the speed of the motor.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES S. TANTER.

Witnesses:

D. W. Cady,
F. H. Gray.

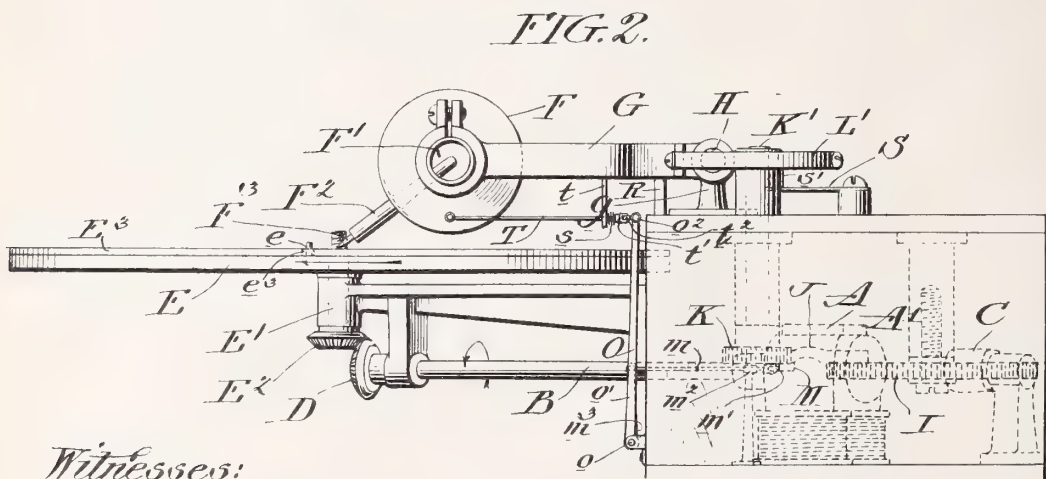
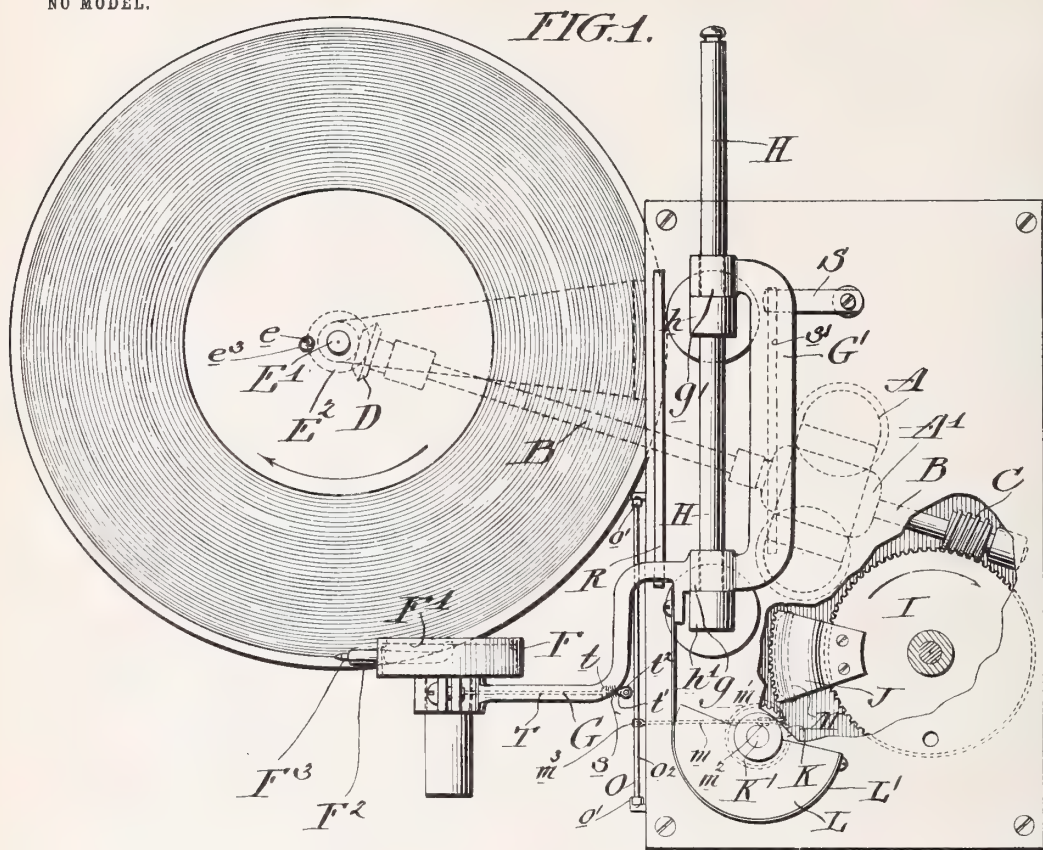
No. 732,292.

PATENTED JUNE 30, 1903.

E. D. GLEASON.
SOUND REPRODUCING MACHINE.

APPLICATION FILED NOV. 4, 1902.

NO MODEL.



Witnesses:
Eugene V. Cogges,
William C. Gaschup.

Inventor:
Edward D. Gleason
By *David S. Williams*
Attorney.

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 732,292, dated June 30, 1903.

Application filed November 4, 1902. Serial No. 130,011. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in sound-reproducing machines in which a stylus is automatically fed forward across the face of a record-disk, turned from engagement with the record at the end of its forward travel, and fed back to the starting-point while in an elevated position.

My invention consists in devices to cause the sound-box to rotate and bring the stylus into engagement with the record with yielding pressure and in mechanism for disengaging the stylus from the record at the end of its forward movement and returning it in an elevated position to the starting-point, all of which will be hereinafter claimed and fully described.

Referring to the accompanying page of drawings, Figure 1 illustrates a plan view of a sound-reproducing machine constructed after the manner of my improvements, with a portion of the casing broken away to more clearly show some of the internal working parts; and Fig. 2 is a side elevation of what is illustrated in Fig. 1.

Referring to the reference-letters of the drawings, A represents an electric motor, the armature-A' of which is mounted upon a driving-shaft B, which is provided with a worm-wheel C, operating the feed mechanism, and a bevel-wheel D, operating the turn-table carrying the record-disk. The turn-table E is mounted upon a shaft E', which is provided with a bevel-gear E², meshing with the bevel-gear D, which, as before stated, is operated by the driving-shaft B. The record-disk E³ rests upon the turn-table E and is turned by a pin e, projecting from the turn-table into an opening e³ in the record-disk.

F represents the sound-box, which is provided in the ordinary way with a diaphragm F', a stylus-lever F², and a stylus F³. The sound-box F is fulcrumed to an arm G, which is connected to and forms part of a bracket G',

having bearings g and g', slidable upon a fixed rod H, supported by uprights n and n'. The arm G in moving forward and backward rests upon a rail R, which it is forced to engage by reason of a fixed leaf-spring S, bearing against a projecting ledge s' on the under side of the bracket G'. As it is not an essential feature of my invention that the arm G should have any movement other than its forward and backward movement upon the rod H, the rail R in some instances may be dispensed with and the bracket G' guided upon a rod H, square in cross-section, instead of the round one I have illustrated.

The feeding of the sound-box and stylus forward is accomplished by means of the stylus engaging the helical groove of the record, and the stylus is caused to bear upon the record with yielding pressure by reason of its pivotal connection with the arm G and a rod T, fulcrumed to the sound-box at one end and carried by a bearing t at the other, between which and the extreme end of the rod T is a spiral spring s. The return-feed for the sound-box and its connecting parts is accomplished by the worm C engaging a worm-wheel I, which is provided with a segmental rack J, timed to engage at intervals a pinion K on a shaft K', which also carries a segment L to receive a metal band L', one end of which is connected to the segment and the other end to the bracket G'.

After the sound-box has been carried forward by the engagement of the stylus with the groove of the record and before the backward or return feed comes into play or at the instant it becomes operative it is necessary to disengage the stylus from the record. This is accomplished by placing on the under side of the segmental rack J a cam M, which at a fixed time presses against a roller m', mounted in the end of a rod m, guided in a bearing m² and connected to a lever m³. The lever m³ operates a rocking frame O, which embraces a shaft o, to which the lever m³ is secured, and uprights o' o', secured at the lower end to the shaft o and at the upper end to a rail o². The extreme end of the rod T, which moves the sound-box, is provided with a bearing t', in which is supported a roller t², which, being at all times in the path of the rail o², is moved

to turn the sound-box and raise the stylus from the record when the rocking frame O is operated through the medium of its connecting parts and the cam M.

5 Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A sound-reproducing machine, comprising a revoluble record-disk, a sound-box provided with a diaphragm and stylus, an arm carrying the sound-box journaled upon a fixed bar, a segment provided with a band, one end of which is connected to said arm, a pinion for turning the segment and a segmental rack connected to the driving mechanism and adapted to turn the pinion and thereby return the sound-box and stylus after they have been fed forward by the groove of the record, substantially as described.

20 2. A sound-reproducing machine, comprising a revoluble record, a sound-box provided with a diaphragm and stylus, the latter being operated in one direction by the groove of the record, a movable arm having a bearing in which the sound-box is free to turn, a rod fulcrumed to and adapted to turn the sound-box to release the stylus from the record at the end of its forward movement and a cam operated by the driving mechanism to move said rod, substantially as described.

30 3. A sound-reproducing machine, comprising a turn-table provided with a record-disk, a sound-box provided with a diaphragm and

stylus carried in one direction by the groove of the record, a slidable arm, one end of which is guided in a bearing and the other being arranged to form a journal in which the sound-box is free to turn, a segment provided with a band connected to said arm, a rack-and-pinion mechanism to operate the segment, to perform the return movement, a rod fulcrumed to the sound-box and arranged to turn the same and lift the stylus at the end of its forward movement, and a cam for operating the rod, substantially as described.

4. A sound-reproducing machine, comprising a rotatable record, a motor for operating the same, a fulcrumed sound-box provided with a diaphragm and stylus, an arm carrying the sound-box slidable upon a guide, a spring interposed between the arm and sound-box to cause the latter to turn and bring the stylus to bear upon the record with yielding pressure, so that the sound-box will be carried forward by the groove of the record, a cam adapted to turn the sound-box and lift the stylus at the end of its forward movement, and a mechanism comprising a segmental rack and pinion to return the sound-box to its initial position, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD D. GLEASON.

Witnesses:

DAVID S. WILLIAMS,
ARNOLD KATZ.



No. 732,820.

PATENTED JULY 7, 1903.

T. BIRNBAUM.

DEVICE FOR THROWING GRAMOPHONES IN AND OUT OF OPERATION.

APPLICATION FILED MAY 5, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

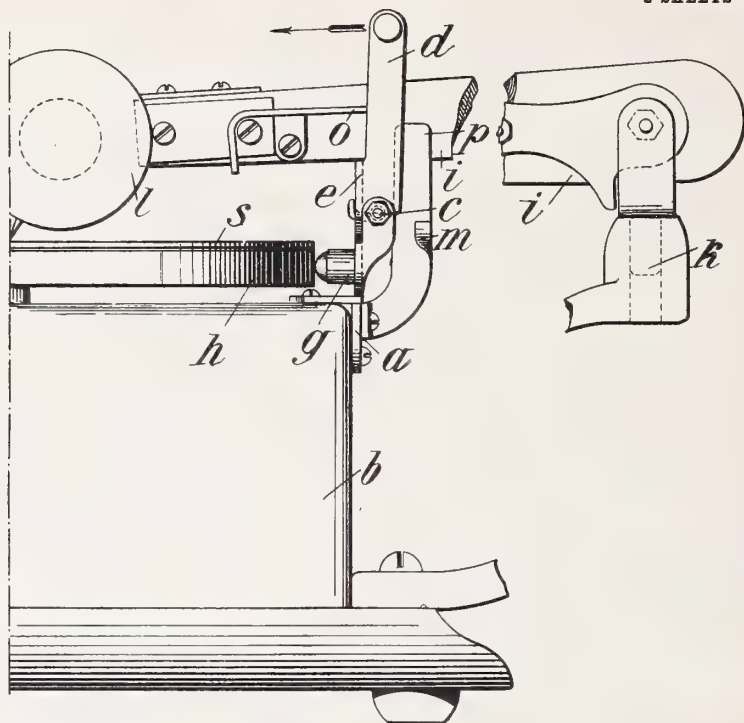
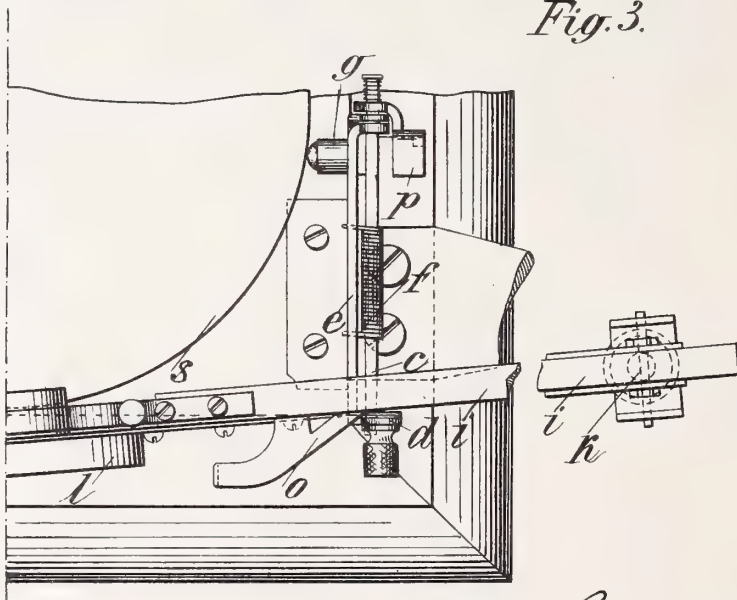


Fig. 3.



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Inventor
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by *Frederic V. Freeman,*
attorneys

No. 732,820.

PATENTED JULY 7, 1903.

T. BIRNBAUM.

DEVICE FOR THROWING GRAMOPHONES IN AND OUT OF OPERATION.

APPLICATION FILED MAY 5, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.

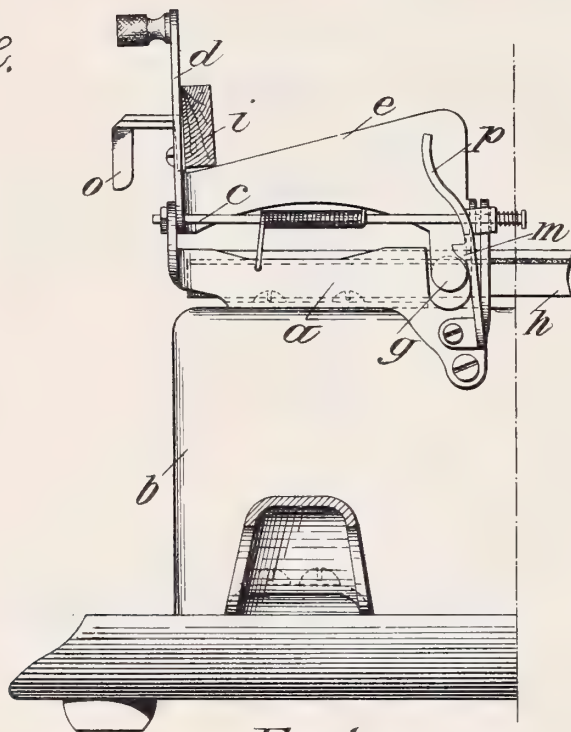
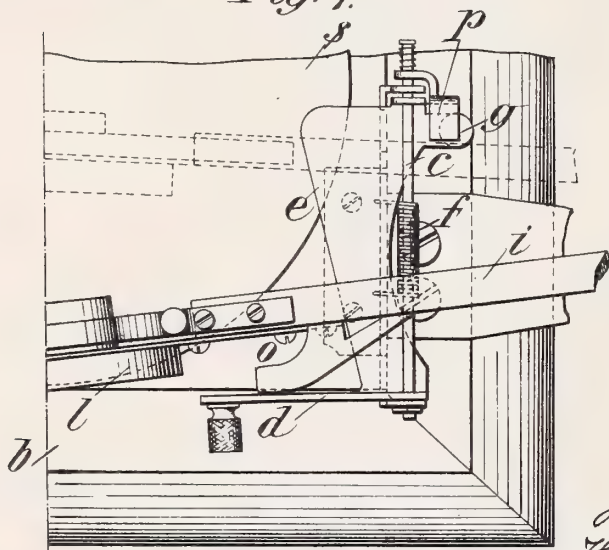


Fig. 4.



Witnesses
John G. Hillman Jr.
Wm. H. Wright

Inventor
Theodore Birnbaum
by *John G. Hillman Jr.*
Wm. H. Wright
Attorneys.

UNITED STATES PATENT OFFICE.

THEODORE BIRNBAUM, OF BERLIN, GERMANY.

DEVICE FOR THROWING GRAMOPHONES IN AND OUT OF OPERATION.

SPECIFICATION forming part of Letters Patent No. 732,820, dated July 7, 1903.

Application filed May 5, 1902. Serial No. 106,040. (No model.)

To all whom it may concern:

Be it known that I, THEODORE BIRNBAUM, managing director, a subject of the King of Great Britain and Ireland, at present residing at 36 Ritterstrasse, in the city of Berlin, in the German Empire, have invented certain new and useful Devices for Throwing Gramophones In and Out of Operation, of which the following is a specification.

This invention has reference to the construction of a device which is intended for lowering the sounding-box arranged at the outside and above the gramophone turning disk upon the sounding-plate on the operation of the gramophone, and it serves at the same time for releasing the brake operating to disengage the gramophone turning disk, while after the reproduction of the piece of music the sounding-box is automatically lifted off by the device and is returned into its initial position. The mere turning of a lever for about a quarter-turn replaces all the manipulations which are otherwise necessary for the operation of a gramophone, while the stopping of the apparatus is effected automatically, as already mentioned.

The new construction is shown on the accompanying drawings in Figures 1, 2, 3, and 4 in several views.

In a support *a*, which is attached to the casing *b* of the gramophone or is integral with the same, a horizontal shaft *c* is journaled, which may be turned by a crank-arm *d*. An inclined plate *e* is connected to the shaft *c* or to the crank-arm *d*, respectively. A spiral spring mounted upon the shaft *c* tends to retain the crank-arm *d* with the plate *e* in their vertical position, as shown in Figs. 2 and 3 of the accompanying drawings. The plate *e* is provided at its rear extremity with a braking-snug *g*, which in the vertical position of the plate *e* is forced against the gramophone-disk *h* by the action of the spring *f*, and thus effects a braking action—that is to say, the gramophone turning disk is stopped while the parts of the mechanism are in their operative position. Upon the upper inclined surface of the plate *e* rests the lever *i*, carrying the sounding-box *l* and which is fulcrumed at *k*. In the vertical position of the plate the lever *i* moves by its own gravity

down upon the lower front part of the plate *e* and places itself against the crank-arm *d*. The sounding-box remains in this position above and at the outside of the sounding-plate *s*, so that the lower part of the sounding-box is easily accessible for the insertion and mounting of a stylus or needle.

When it is desired to operate the gramophone after the operating mechanism has been wound up, the crank-arm *d* is turned to the left for about a quarter-turn until the plate *e* has assumed an approximately horizontal position. The projection on which the braking-snug *g* is fastened will in this position push back the spring-acting projection *m*, so as to retain the plate by this projection in its horizontal position. The lever *i*, to which the sounding-box is attached, is provided with a staple-like projection *o*, as shown in Figs. 1, 2, 3, and 4 of the drawings. When the lever *d* is lowered, this projection pushes the arm *i* back and effects a displacement of the sounding-box toward the center of the sounding-plate, besides lowering the sounding-box *l*. As already mentioned, the sounding-box is above and at the outside of the sounding-plate in its raised position, the plate *e* being vertical. For lowering the sounding-box it therefore becomes necessary to also effect a displacement of the sounding-box toward the center, so as to guide the needle to make it enter the sounding-line, which commences in the proximity of the outer edge of the sounding-plate. Simultaneously with the turning down of the crank-arm *d* the braking-snug *g* is withdrawn from the gramophone turning disk *h*, as shown in Fig. 1 of the drawings—that is to say, the brake is withdrawn, so as to release the gramophone turning disk which is rotated by the mechanism. When the needle has entered the record-line of the rotating sounding-plate, the reproduction of the piece of music of the sounding-plate commences, which in consequence of the spiral-shaped arrangement of the record-line causes the sounding-box to move gradually toward the center, while the lever *i*, carrying the sounding-box, is rotated simultaneously on its shaft at *k*. As soon as the needle of the sounding-box has arrived at the end of the record-line

the rotation of the lever *i* is continued, by means of any well-known positive guiding movement of the needle, toward the center of the sounding-plate, the said lever impinging against an upper extension *p* of the spring-acting projection *m*, which is thrown back, so as to release the plate *e*. By the action of the spring *f* the plate *e* is returned to its vertical position, and in consequence the braking-snug *g* is forced against the gramophone turning disk *h*, so as to stop the latter, while at the same time the sounding-box *l* is lifted off from the sounding-plate and is returned to its initial position with the lever *i*, the lever *i* moving down upon the upper inclined edge of the plate *e* into its initial position, as shown in Fig. 2 of the drawings. For operating the gramophone once more it is only necessary to turn the crank-arm *g* to the left until the plate *e* is retained in its horizontal position by the projection *m*, the mechanism being likewise wound up, if necessary, while after the piece of music is finished the throwing out of operation of the apparatus is effected automatically.

What I claim, and desire to secure by Letters Patent of the United States, is—

Combined starting and stopping device for gramophones comprising the combination with a gramophone-plate and a sounding-box of a spring-actuated horizontal rotatable shaft, a rotating handle and an inclined way and a brake for the gramophone-plate, a pivoted sounding-box-bearing arm and which is movable along the said inclined way and provided with a projection to engage with the said rotating handle, a spring-acting arm for retaining the inclined way in its horizontal position and in the path of the said gramophone-brake and bearing a stop against which the sound-box-bearing arm may impinge and release the inclined way.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE BIRNBAUM.

Witnesses:

WOLDEMAR HAUPT,
HENRY HASPER.

7-3521

No. 733,521.

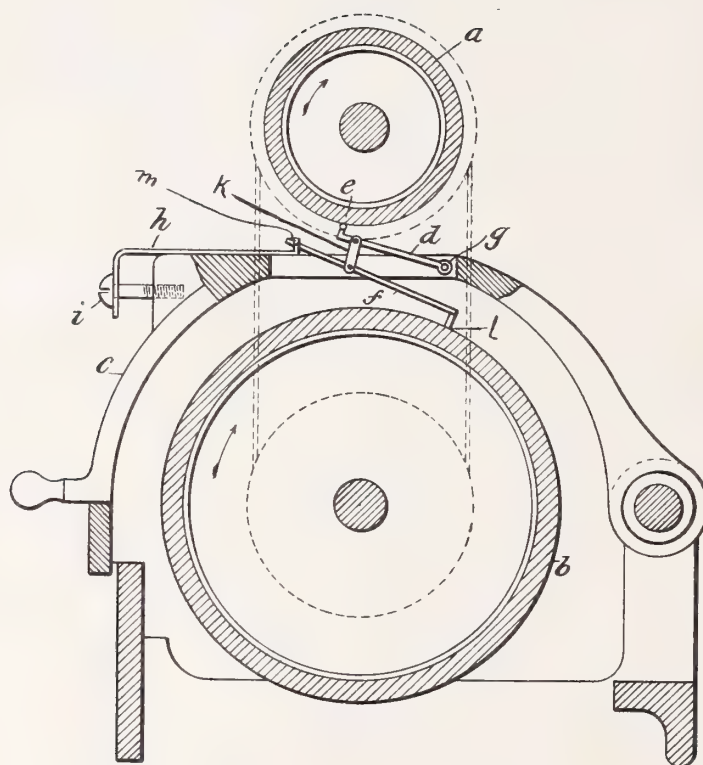
PATENTED JULY 14, 1903.

C. WALCUTT.

APPARATUS FOR DUPLICATING PHONOGRAPHIC SOUND RECORDS.

APPLICATION FILED JAN. 9, 1901.

NO MODEL.



WITNESSES

J. L. Wherry

INVENTOR

Cleveland Walcutt
per. Fred C. Fischer
ATTY

UNITED STATES PATENT OFFICE.

CLEVELAND WALCUTT, OF ASNIÈRES, FRANCE.

APPARATUS FOR DUPLICATING PHONOGRAPHIC SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 733,521, dated July 14, 1903.

Application filed January 9, 1901. Serial No. 42,655. (No model.)

To all whom it may concern:

Be it known that I, CLEVELAND WALCUTT, a citizen of the United States, residing at Asnières, Seine, France, have invented certain new and useful Improvements in Apparatus for Duplicating Phonographic Sound-Records, of which the following is a specification.

The object of my invention is to provide a mechanism adapted to cut an amplified reproduction of the record from a phonographic cylinder or disk. Such amplified reproduction may be cut upon a cylinder of larger diameter or disk of larger surface. To do this, I provide a suitable frame to carry two phonogram-cylinders mounted upon parallel shafts separated a suitable distance to admit of the interposition of a stylus system between the same. Said stylus system instead of being pivoted centrally is pivoted nearer to the cylinder bearing the record, so that the longer-cutting stylus may have an amplified movement. It is intended thus to provide a means of transferring the record from an ordinary cylinder to a cylinder of larger diameter.

It is well known that the imperfections in phonographic reproductions are due in part to the fact that the spherical reproducer is not allowed to engage all the portions of the record representing fundamental tones and principal overtones, because some of the waves or gouges thereof are of less length than width. Owing to the relatively great diameter of the recording edge to the depth of the cut all the depressions of which the record is formed are characterized by a greater width than depth. In the case of waves which are of a greater length than width the reproducer will be free to engage the entire length of the wave; but when the length of the wave is less than its width the spherical reproducer will not be allowed to engage the record-groove, but will be arrested by the crests of the adjacent waves. The reproducer in the latter case, therefore, does not accurately track the record, and the reproducer-diaphragm is not vibrated in accordance with the record.

To this end my invention consists in employing two cylinders, one of which is a record-bearing cylinder and the other a cylinder of larger diameter to receive the ampli-

fied duplicate record. I use a large cylinder in order to obtain better reproductions by increasing the peripheral speed of the recording-surface.

The figure is a sectional end elevation showing the features of my invention, in which—
a represents the record-bearing cylinder, having its direction of rotation indicated by an arrow.

b represents the enlarged cylinder, having its direction of rotation also indicated by an arrow.

c represents a traveling arm adapted to move in the line parallel with the axis of the cylinders *a* and *b*.

d represents the stylus, having a reproducer-ball *e* on one end and connecting with cutting-stylus *f*.

The stylus system consists of the stylus-lever *d*, pivoted to the traveling arm *c* at *g*, and is provided with the reproducing stylus or ball *e* and the stylus-lever *f*, suspended between its ends from the lever *d* by means of the link *k* and carrying upon its longer arm the cutting or recording stylus *l*, the opposite end being pivotally connected with the adjusting-arm *h* at *m*, as shown, which is secured to the traveling arm *c* by means of the adjusting-screw *i*, as shown. By this means and because of the angular position of the link *k* with respect to the levers *d* and *f* the adjustment of the screw *i* inwardly will produce a greater pressure of the two styluses upon their respective cylinders, while the withdrawal of the screw will reduce such pressure or finally withdraw the stylus system completely from contact with the cylinders preparatory to their removal from the mandrels. It will be noticed that all of the movements of the reproducing stylus or ball *e* due to its following the groove in the master-record are communicated with increased amplitude to the cutting or recording stylus *f*, thereby increasing the depth of the furrow or cut upon the duplicate cylinder, and inasmuch as the duplicate cylinder has a greater surface speed than the master record or cylinder it is clear that the duplicate record will be considerably amplified.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a phonographic-record-duplicating device, the combination, of a traveling arm, a stylus system mounted thereon, said system consisting of reproducing and recording stylus-levers, a link connecting said levers, and a screw adjustment device consisting of a rigid bar mounted upon the traveling arm and pivotally connected at one end to the end of one of the stylus-levers, and means for adjusting said bar whereby the pressure of the two styluses upon their respective cylinders may be varied and positively regulated.

2. In a phonographic-record-duplicating device, the combination of a traveling arm, a stylus system mounted thereon said system consisting of reproducing and recording stylus-levers, a link connecting said levers intermediate their ends, one of said levers being pivoted to the traveling arm, an adjusting-arm consisting of a rigid bar mounted upon the traveling arm, a pivotal connection between the other lever and said adjusting-arm, and a positive means for producing a longitudinal adjustment of said adjusting-

arm whereby the pressure of the two styluses upon their respective cylinders may be regulated.

3. In a phonographic-record-duplicating device, the combination of a traveling arm, a lever carrying a reproducing stylus or ball pivotally secured thereto, an adjusting-arm consisting of a rigid bar mounted for longitudinal movement upon said traveling arm, a lever carrying a recording-stylus pivotally secured to said adjusting-arm and a link connecting said levers intermediate their ends, whereby the longitudinal movement or adjustment of the adjusting-arm will produce a varied pressure of the two styluses upon their respective cylinders.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of December, 1900.

CLEVELAND WALCUTT.

Witnesses:

EDWARD P. MACLEAN,
GEORGE E. LIGHT.

734 vol

Willms

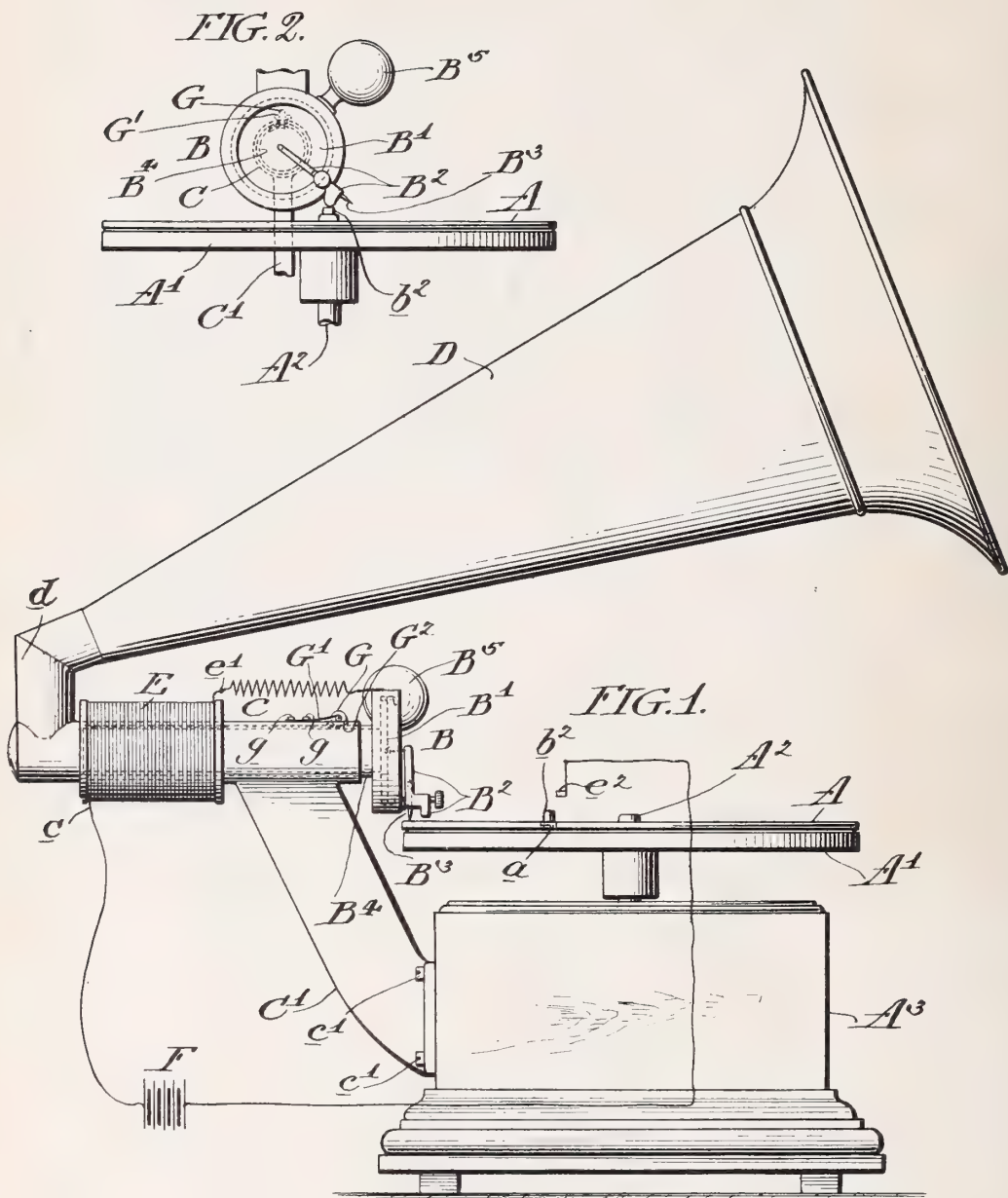
No. 734,206.

PATENTED JULY 21, 1903.

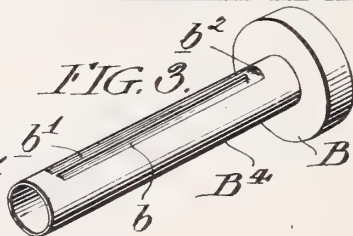
J. WELLNER.
SOUND REPRODUCING MACHINE.

APPLICATION FILED NOV. 29, 1902.

NO MODEL.



Witnesses:
Sally C. Foster
William C. Garrud.



Inventor:
Julius Wellner
by
S. Williams
Atty.

UNITED STATES PATENT OFFICE.

JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 734,206, dated July 21, 1903.

Application filed November 29, 1902. Serial No. 133,216. (No model.)

To all whom it may concern:

Be it known that I, JULIUS WELLNER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Reproducing Machines, of which the following is a specification.

My invention relates to improvements in sound-reproducing machines; and it consists of devices for supporting and guiding the sound-box, in mechanism for raising and lowering the stylus-needle to and from the record at extremity of its forward and backward movements, and in means for controlling the motion of the sound-box, all of which will be hereinafter fully described.

Referring to the accompanying page of drawings, Figure 1 illustrates a side elevation of a sound-reproducing machine with the stylus in position to be fed forward by the groove of the record. Fig. 2 represents a detached front elevation of the sound-box and its supporting-tube with the sound-box feed forward to the full extent of its movement and the stylus lifted from the record, and Fig. 3 shows a perspective view of the sound-box detached from its supporting-tube.

Referring to the reference-letters of the drawings, A represents the record; B, the sound-box; C, the carrying-tube, and D the horn. The record A is supported on a turn-table A', which is fastened to a shaft A², suitably journaled in the frame A³ of the machine. The shaft A² may be driven by a suitable prime mover—such, for instance, as an electric motor—or by the well-known spring-driven clockwork mechanism.

The sound-box B is provided in the usual way with a diaphragm B', a stylus-lever B², and a stylus B³, and in addition to these has a long tube B⁴ projecting out from the center, which is guided in the carrying-tube or journal C. The tube B⁴ of the sound-box has pressed into its sheet two parallel grooves b and b', which are brought together by a channel at a point b². The sound-box being free to turn in the journal C is provided with a weighted lever B⁵, by which the stylus is caused to turn and engage the groove of the record when it is moving forward.

The carrying-tube C, which forms a jour-

nal for the tube B⁴ of the sound-box, is fastened to an arm C', which is secured to the frame A³ of the machine by screws c' c'.

The horn D, which for the convenience of space is located directly above the turn-table, is rigidly connected to the carrying-tube C by an elbow d.

Supported upon the tube C, which is of thin brass, is a solenoid E, the terminals e and e' of which are connected to a source of electrical energy F. On the upper side of the tube C, at the end nearest the sound-box, is a roller G, journaled in a leaf-spring G⁸, which is fastened to the tube by screws g g. The roller G passes through an opening G² in the tube C and by virtue of the spring G' is caused to engage either the groove b or b' of the tube B⁴.

When the sound-box is in the position shown in Fig. 1, the roller G will rest in the groove b, which is of sufficient width to allow the sound-box to turn and engage the groove of the record under the influence of the weighted lever B⁵. When the sound-box has been fed forward to the full extent of its movement by the groove of the record, the stylus-lever B² is brought in contact with a pin b², fastened to the turn-table A⁸ and passing through a hole a in the record A. As the turn-table revolves the pin b² engages the stylus-lever B² and causes it to turn, as shown in Fig. 2, thus forcing the roller G out of the groove b into the groove b', and at the same time electrical contact is made by the stylus-lever engaging a contact e², causing the solenoid E, which acting upon the iron tube B⁴ of the sound-box to draw it into the position shown in Fig. 1, at which point the roller G approaches the passage b², and by the turning of the sound-box under the influence of the weighted lever B⁵ finally enters the groove b.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A sound-reproducing machine, comprising a turn-table rotatable in fixed bearings and adapted to receive a record-disk, a sound-box provided with a diaphragm, stylus-lever and stylus, a tube projecting out from the center of the sound-box, and a fixed tubular support loosely surrounding the tube of the sound-box and forming an axial bearing in which the sound-box may freely turn as well

as a bearing to guide the tube of the sound-box as the stylus traverses the helical groove of the record.

2. A sound-reproducing machine in combination with the turn-table, a sound-box provided with a diaphragm and stylus, and with a centrally-projecting tube, a fixed tubular bearing surrounding the tube of the sound-box and forming an axis for the sound-box and its tube in which it may rotate as well as a bearing to guide the sound-box and its tube as the stylus traverses a helical record-groove, and a weighted lever projecting out from the rim of the sound-box to cause the same to turn and retain the stylus in communication with the record-groove, substantially as described.

3. A sound-reproducing machine comprising in combination, a turn-table adapted to receive a record, a sound-box adapted to slide and free to turn, a fixed hollow bearing supporting the sound-box, and a pin mounted upon the turn-table and adapted to turn the sound-box, substantially as specified.

4. A sound-reproducing machine, comprising in combination, a turn-table, adapted to receive a record, a sound-box adapted to slide and free to turn, a fixed hollow journal carrying the sound-box, a pin mounted upon the turn-table and adapted to turn the sound-box, and means for returning the sound-box after it has been fed forward over the turn-table, substantially as described.

5. A sound-reproducing machine, comprising a turn-table, suitably supported and rotated, provided with a record-disk, a sound-box adapted to slide and free to turn, a weighted lever to turn the sound-box and cause it to engage the record, a pin mounted upon the turn-table and adapted to turn the sound-box at the end of its forward move-

ment, a fixed hollow bearing carrying the sound-box, means to carry the sound-box to move forward and backward in said bearing, and a horn connected to and extending out from said hollow bearing, substantially as specified.

6. A sound-reproducing machine, comprising a turn-table having a record, a sound-box having a projecting tube provided with grooves, a fixed hollow bearing carrying said tube, a spring-pressed roller adapted to said grooves, means for turning the sound-box at the end of its forward travel so as to cause the roller to move out of one end and into the other of the grooves and thereby raise the stylus from the record, means to return the stylus to its initial position, substantially as described.

7. A sound-reproducing machine, comprising in combination, a turn-table, a sound-box mounted in a journal and adapted to slide and free to turn, means for feeding the sound-box forward, and turning it at the end of its forward movement and a solenoid for returning the sound-box to its initial position, substantially as specified.

8. A sound-reproducing machine, comprising in combination a rotary sound-box carrying a stylus, a turn-table, a record-disk upon its turn-table provided with a helical record-groove, a projecting pin at the inner extremity of said groove and operated to turn the sound-box bodily and thereby disengage the stylus from the record.

In testimony whereof I affix my signature in presence of two witnesses.

JULIUS WELLNER.

Witnesses:

DAVID S. WILLIAMS,
ARNOLD KATZ.

735, 574

No. 735,579.

PATENTED AUG. 4, 1903.

A. N. PETIT.

METHOD OF FORMING DUPLICATE SOUND RECORD CYLINDERS.

APPLICATION FILED OCT. 11, 1902.

NO MODEL.

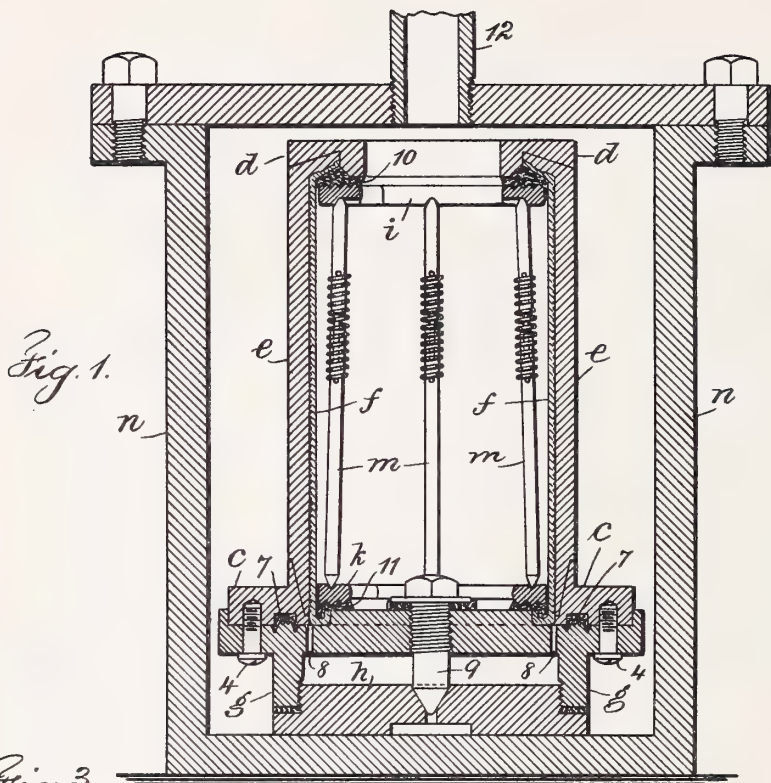


Fig. 3.

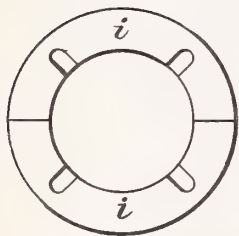
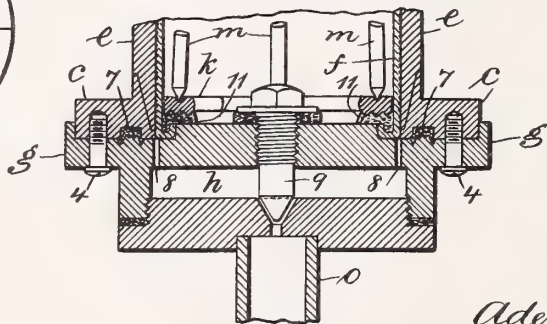


Fig. 2.



Witnesses

Charles H. Smith
J. Stair

Inventor

Adenor N. Petit.

for L. H. Lowell & Son
attys

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF LIVERPOOL, ENGLAND, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

METHOD OF FORMING DUPLICATE SOUND-RECORD CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 735,579, dated August 4, 1903.

Application filed October 11, 1902. Serial No. 126,864. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Liverpool, in the county of Lancaster, England, have invented an Improvement in Methods of Forming Duplicate Sound-Record Cylinders, of which the following is a specification.

The object of my invention is to produce a more perfect and commercial sound-record of cylindrical form and made of celluloid or other similar or suitable material than it has heretofore been possible to produce in an effort to overcome the harsh and grating sounds usually incident to records of celluloid. In an application for Letters Patent filed by me May 15, 1902, Serial No. 107,453, I have illustrated and described a metal matrix and receptacle suitable for carrying out the method of the present application.

In carrying out the method of my present invention I place the celluloid blank within the matrix, connect the matrix to a suitable base, and seal the respective ends of the celluloid blank to the matrix and the base, exhaust the air, and remove the moisture that may be between the juxtaposed surfaces of the matrix and celluloid blank. I then place said parts in a suitable receptacle and apply heat to soften the celluloid blank and pressure to force the same into intimate contact with the matrix to form a duplicate sound-record, thereafter cooling the body of celluloid and removing the same from the matrix as a complete duplicate sound-record cylinder. The blank of celluloid or other suitable material is preferably made with intumed ends of varying diameters to agree with and fit the taper mandrel of the reproducing-machine, and this blank is preferably passed into the matrix from the lower open end. The sealing of the respective ends of the blank to the matrix and base is not only for the purpose of forming an air-tight joint, but to prevent the entrance of the steam, hot gases, or hot water that may be applied to soften the blank, as well as to prevent the entrance of material by which pressure is exerted to force the blank outwardly into the interstices of the matrix.

In the apparatus employed to carry out this method and with particular reference to sealing the ends of the blank I employ elastic washers at the respective ends of the blank and against the elastic washers clamping-rings which form seats for spring-actuated tension-rods which extend between the said clamping-rings and act to force the same outwardly, simultaneously compressing the elastic washers to place. The heat and pressure mediums are preferably passed into the receptacle containing the apparatus through a pipe in the cover, and before the apparatus is inserted into the receptacle the air and moisture are exhausted by means of devices in the base connected to the matrix and which structure is hereinafter fully described.

In the drawings I have illustrated a device adapted for the carrying out of my improved method, in which—

Figure 1 is a vertical section and partial elevation representing the complete apparatus and parts employed by me. Fig. 2 is a vertical section and partial elevation of the parts directly associated for the purpose of effecting the vacuum, and Fig. 3 is an inverted plan of the upper clamping-ring.

The matrix employed comprises a ring or annulus *c* at the lower end, a ring or annulus *d* at the upper end, and an intervening electrodeposited cylinder *e*, the said parts *c d e* forming an integral whole or matrix in which the blank *f* is received. Referring to Fig. 2, after the insertion into the matrix of the celluloid blank, the matrix is secured by the screws 4 to a base *g*, which base is provided with a flange interiorly threaded in part and to which the base-block *h* is secured by screwing the parts together, with an intervening washer which forms an air-tight joint.

It will be noticed that in the base of the matrix there is an annular groove, and in this I place a packing-ring 7, and the adjacent surface of the base *g* is preferably made with shallow concentric grooves, so that when the matrix and the base *g* are connected by the screws 4 the packing 7 fills the grooves and at this point also makes an air-tight joint.

In the center of the base there is a tap-

screw 9, passing through the base, with the head above the base, and a washer, preferably of elastic character, between the head and the base, and this screw is made with a conical end, and the center of the base-block is perforated, the upper end of the perforation being conical to receive the conical end of the tap-screw 9.

Within the celluloid blank *f* and at the respective ends (see also Fig. 1) are flexible or elastic material washers 10 11, covered by clamping-rings *i k*, and between said clamping-rings I employ spring-actuated tension-rods *m*, the office of which is to press the clamping-rings apart and press the flexible or elastic washers 10 11 against the respective ends of the celluloid blank and the matrix at one end and the base *g* at the other end, so as to effectually close off the joint between the ends of the celluloid blank and the matrix and base, and so prevent the entrance of air or of any material that may be within the blank passing between the surface of the blank and the surface of the matrix. These clamping-rings *i k* are preferably made in two parts for ready insertion within the matrix and celluloid blank, and they are preferably provided upon their surfaces contacted with by the spring-actuated extension-rods *m* with recesses into which the ends of said extension-rods pass, so as to prevent their shifting from the position in which they are placed. Through the base *g* there are apertures 8, which vertically agree with the line of division between the inner surface of the matrix *e* and the outer surface of the celluloid blank, and before the parts are inserted into the receptacle *n* I apply a device *o* for exhausting air to the lower surface of the base-block *h*, adjacent to the central opening therein and preferably in a recess provided therefor, and at the same time I loosen the tap-screw 9, so as to exhaust any air that there may be between the juxtaposed surfaces of the matrix and blank of celluloid or similar material and to remove also any moisture that there may be between said surfaces, thus preparing for close and intimate contact of said surfaces during the further treatment of the blank. Upon exhausting this air and removing the moisture the tap-screw 9 is forced tightly down to its seat to close off the opening in the base-block *h* and complete the seal of the parts. The apparatus is then placed in the receptacle *n*, the removable cover is fastened thereon, and through the pipe 12 in the cover steam or hot water is introduced into the receptacle and within the celluloid blank and against the inner surface thereof and pressure is applied, the heat softening the blank and the pressure forcing the same outward into all the delicate interstices of the matrix and at the same time forcing the turned-over end of the celluloid blank against the matrix to receive the impression of the name, the intimate contact thus effected being made possible and insured by the previ-

ous removal of the air and moisture from the juxtaposed surfaces of the matrix and blank.

I do not limit myself to the use of steam or hot water, as any fluid under pressure and in the presence of heat may serve an equal purpose. After maintaining the pressure and heat for the desired period the celluloid duplicate sound-record is cooled, preferably by the introduction of cold water. This fixes the celluloid or similar material, reduces it to its normal non-plastic condition, causes a slight shrinkage or contraction of the same, which appreciably separates the surface of the duplicate sound-record cylinder from the surface of the matrix. The apparatus is then removed from the receptacle *n* and the parts separated and the duplicate sound-record cylinder taken out of the matrix, the same then becoming a finished article of commerce.

The molding of a record with a smooth and perfect surface depends upon exhausting the air between the juxtaposed surfaces of the matrix and celluloid-blank cylinder before the application of heat and pressure to soften and force the material into intimate contact with the matrix-surface; otherwise any air or gases or moisture that may exude from the molding composition during the application of heat and pressure will lodge between the matrix and material and cause the surface of the record-cylinder to yield an imperfect reproduction in which crackling and hissing sounds are in evidence.

Previous to inserting the blank of celluloid or other suitable material in the matrix and applying thereto heat and pressure I may prefer to treat the surface thereof with the solvent preparation described in Letters Patent granted to me December 4, 1900, No. 662,961, so as to slightly soften the surface and insure the most intimate contact.

I claim as my invention—

1. In the method of forming duplicate sound-record cylinders of celluloid or similar material, placing the celluloid blank within the matrix, connecting the matrix to a suitable base, sealing the respective ends of the blank to the matrix and the base, exhausting air and removing moisture between the juxtaposed surfaces of the matrix and celluloid blank, applying heat to soften the celluloid blank and pressure to force the same into intimate contact with the matrix to form a duplicate sound-record, thereafter cooling the celluloid and removing the same from the matrix, substantially as set forth.

2. In the method of forming duplicate sound-record cylinders of celluloid or similar material, the method of placing the celluloid blank within the matrix, connecting the matrix to a suitable base and at the same time forming an air-tight joint between said parts, sealing the respective ends of the blank of celluloid or similar material to the matrix and to the base, exhausting the air and removing any moisture between the juxtaposed surfaces of the matrix and celluloid blank, and

maintaining the vacuum so produced, substantially as set forth.

3. In the method of forming duplicate sound-record cylinders of celluloid or similar material, the method of placing the celluloid blank within the matrix, connecting the matrix to a suitable base and at the same time forming an air-tight joint between said parts, applying against one end of the blank and the matrix and against the other end of the blank and the base suitable expansive devices under tension for sealing the respective ends of the blank and for continuously ex-

erting and maintaining a sealing pressure, exhausting the air and removing moisture between the juxtaposed surfaces of the matrix and celluloid blank and maintaining the vacuum so produced, substantially as set forth. 15

Signed by me this 24th day of September, 20 1902.

ADEMOR N. PETIT.

Witnesses:

RICHARD MILBORN,
H. WATSON.

735, 579.

735.426

G. WOOD.

AUTOMATIC RETURN FEED MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED FEB. 24, 1903.

NO MODEL.

Fig. 1.

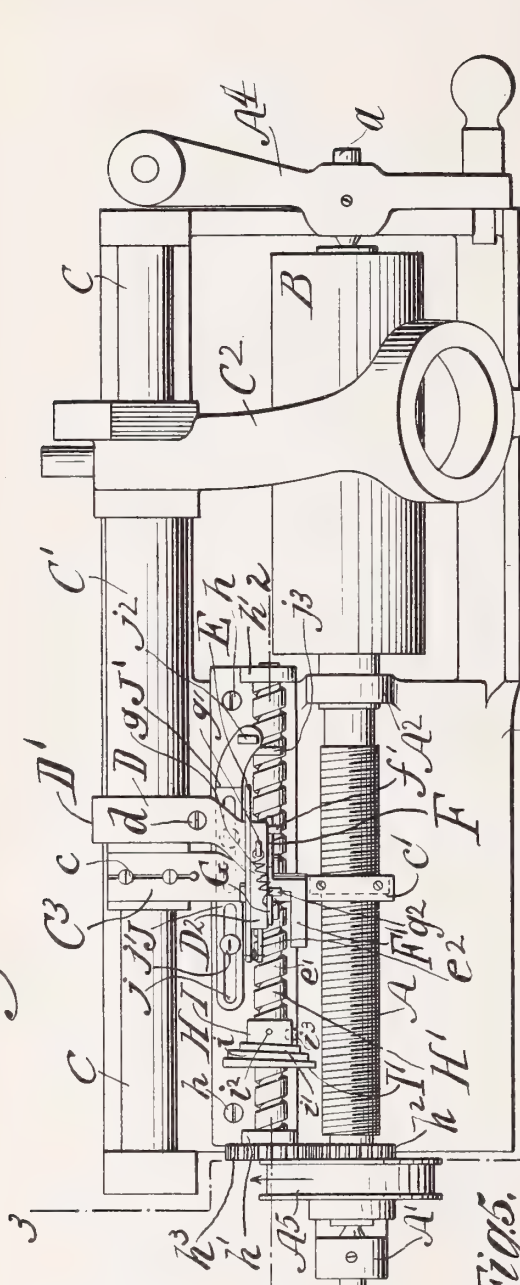


Fig. 2.



Fig. 3.

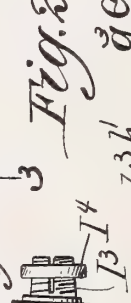


Fig. 4.



Fig. 5.



WITNESSES:

B. Patterson.

J. J. Leba

INVENTOR

George Wood

BY

Charles Dummer

ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE WOOD, OF EAST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF
TO FRANK N. DEVORSS, OF NEW YORK, N. Y.

AUTOMATIC RETURN-FEED MECHANISM FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 735,926, dated August 11, 1903.

Application filed February 24, 1903. Serial No. 144,601. (No model.)

To all whom it may concern:

Be it known that I, GEORGE WOOD, a citizen of the United States, and a resident of East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Automatic Readjusting Means for Phonographs, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof, in which similar letters of reference indicate corresponding parts.

The present invention relates to automatic return-feed mechanism for photographs, and has for its more prominent objects simplicity of parts, positiveness of operation, and adaptability to existing constructions of phonographs.

With the above and other purposes in view the invention comprises novel readjusting means, preferably in a form designed for attachment to a phonograph, and which when the limit of the record-cylinder is reached are automatically thrown into action, causing the elevation of the resonator-arm to remove the tracker-pin from the cylinder, coincidentally interrupt the operative relation of the devices for forwardly feeding the arm, thereafter effect the regular reverse movement of and lowering of same to again bring the tracker-pin into engagement with the cylinder-surface at the starting-point thereof.

There are other important features and details connected with the invention which are fully explained in the subsequent detailed description.

The invention is particularly useful in connection with those constructions of phonographs wherein the primary motor medium is coin-controlled.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of so much of a phonograph as is necessary to disclose my invention. Fig. 2 is a vertical detail sectional view of the apparatus disclosed in Fig. 1, the section being taken in the plane indicated by the broken line 2 2 of said latter figure looking in the direction of the arrow. Fig. 3 is a vertical transverse section of the apparatus, the section being taken in the plane indicated by the broken line 3 3, Fig. 1. Fig. 4 is a detail face view

of an eccentric constituting an important feature of the invention, and Fig. 5 is a detail side view illustrating a modification of said eccentric.

As shown, the revolving record-mandrel, together with the threaded shaft A, constituting an extension thereof, is rotatably mounted in suitable bearings A' A² on the bed A³, the laterally-swinging keeper A⁴ at one end of the machine having the centering-journal *a* and permitting the application and removal of the record-cylinder B in an obvious manner. A belt-pulley A⁵ on the end of the shaft A provides for the rotation of the same by suitable primary power means.

On the guide-rod C, located on the bed at its rear, is slidingly and revolubly mounted the sleeve C', carrying at one end the forwardly-extending resonator-arm C², while at its other end it is equipped with the devices for engaging the threads on the shaft A and actuated by the same for causing the longitudinal movement of the sleeve to accomplish the traverse of the arm C² over the record and in the direction of the keeper A⁴. The devices referred to comprise a forwardly-projecting member C³, having a rear slotted portion by which it can be rigidly secured by screws *c* to the contiguous end of the sleeve C', while at its forward end said member has a nut-segment *c'*, embracing the upper portion of the shaft A at one point thereof and engaging the threads of the same to be actuated when the shaft revolves.

A forwardly-extending hanger D, more immediately constituting one of the features of my invention, has a divided butt D', by which it may be mounted on the sleeve C' and rigidly clamped thereto by a screw *d*, said hanger being represented in Fig. 1 as being secured contiguous to the member C³. At its front end the hanger is provided with a vertical block or plate D², on the rear face of which is pivoted an elongated latch E, the hook end *e* of which is normally maintained in the depressed position (illustrated in Fig. 2) by a contractile spring *e'*, attached to the opposite end of said latch and to a small horizontal bracket *e*² on the block D². Dotted lines, Fig. 2, indicate that the body *e*³ of the latch is of such shape that the lower edge of said

body bears against the horizontal portion of the hanger adjacent to the block, and thereby limits the downward movement of the end *e* of said latch. Also pivotally mounted on the block *D*², but on the front vertical face thereof, is a dog *F*, which below its pivot tapers to a lower point *f*. The swing of the dog is limited in either direction by small stops *f'* *f*², projecting from the block. The dog *F* is normally maintained in the inclined position (shown in Fig. 2) by a weight *F'*. Likewise pivotally on the front face of the block is a pawl *G*, the upper end of which extends for a short distance above the block and is connected by a contractile spring *g* to a fixed bracket *g'* on the block top, so that said pawl is normally held in the position indicated in Fig. 2, arrested at one of its edges by a stop *g*², projecting from the block. The lower portion of the pawl *G* is shaped to present a depending nose *g*³, the end of which is slightly beveled.

On the bed *A*³ at the rear of the shaft *A* is secured by screws *h h* a carrier *H*, comprising the extended bottom plate of approximately rectangular configuration and provided at its ends with the vertical bearings *h'*, in which are revolvably mounted the ends of a return-feed shaft *H'*, which is spirally grooved and arranged counter to the shaft *A* and driven therefrom, but in a relatively reverse direction, by intermeshing gear-wheels *h*² *h*³, keyed respectively, on said shafts *A* and *H'*.

It will be observed that the shaft *H'* is disposed in the same vertical plane with that in which are the dog *F* and pawl *G*.

Removably on the return-feed shaft is a small collar *I*, integrally carrying a disk *I'*, at one side of which is a spirally-arranged eccentric presented by shoulders *i i'*, merging with each other and vanishing at the collar, as illustrated most clearly in Fig. 4. It will be noted by reference to Fig. 4 that the eccentric presented by the shoulders *i i'* vanishes in a direction opposite to that in which the shaft *H'* rotates. The shoulder *i* has at one point a distinct cam *I*². The collar has in its upper side a small follower *i*², which when the collar is in position extends within the spiral groove of the shaft *H'* at one point thereof. Said collar is adapted to be rigidly secured to the shaft *H'* by a clamp-screw *i*³, which bears in the collar and has its inner end in biting engagement with the contiguous surface of the shaft.

Located upon the base-plate of the carrier *H* is a gage *J*, having an extended flat body portion containing longitudinally-alined slots *j*, in which lie screws *j'*, engaging the said base-plate and adapted to adjustably clamp said gage in any position to which it may be moved relative to the carrier.

At its inner end the gage *J* has an angular standard *J'* slightly curved in a forward direction, so that the upper portion of a lug *j*² on the horizontal portion thereof will lie in the path of inward traverse of the hook end

c of the latch, said upper portion being beveled at its top, so that the curved edge of the end *e* will contact with and ride on said beveled top to effect the lifting of the latch on its pivot. The horizontal part of the standard also has a horizontal pin *j*³ forwardly projecting therefrom, so as to be contacted with the edge of the dog *F* and effect the movement of the same on its pivot.

The gage *J* and the collar *H* are so adjusted that the threaded portion of the shaft *A* to be traversed by the nut *c'* will correspond with the traverse of the tracker-pin carried by the arm *C*² on the record-surface of the cylinder *B*, the position of the lug *j*² being such that the dog *F* will contact therewith at the predetermined limit of the record-surface.

Assuming that the dog *F* and pawl *G* are in the positions illustrated in Fig. 2 and the sleeve *C'* occupies a position whereby the nut *c'* is engaged with the shaft *A*, correspondent with the beginning of the record-surface, the proper rotation of the shaft *A* will not only occasion the revolution of the cylinder *B*, but coincidentally cause the inward movement of the nut *c'*, and consequently the longitudinal movement of the member *C*³, hanger *D*, sleeve *C'*, and resonator-arm *C*², so that the tracker-pin traverses the entire record-surface. At about the time the limit of said record is reached the hanger *D* will have moved to such position that the hook end of the latch will ride upon the lug *j*² and drop over into engagement with the same. The further inward movement of the hanger will bring the dog *F* into contact with the pin *j*³, causing the dog to more nearly approach a vertical position and engage its lower end with the spiral groove of the shaft *H'*. The reverse rotation of the latter, combined with the purchase afforded by the latch engagement with the lug *j*², will result in the block being for a short time held stationary while the dog is moved to a full vertical position, raising the hanger and releasing the latch, partially turning the sleeve *C'* in the guide-rod, lifting the nut *c'* out of engagement with the shaft *A*, and also lifting the resonator-arm to throw the tracker-pin out of operable relation with respect to the record-cylinder *B*. The further reverse rotation of the shaft *H'* will cause its spiral groove, through the medium of the engaged dog *F*, to retract the hanger and with it the member, sleeve, and resonator-arm, the sleeve meanwhile being still so partly turned that the nut *c'* and resonator-arm are retained in the elevated positions referred to. When the hanger *D* arrives adjacent to the collar, the lower end of its pawl *G* will be at such altitude that it will be brought in contact with the periphery of the eccentric-shoulder *i*, which in revolving will cause its cam *I*² to lift the pawl and elevate the hanger to such extent as will raise the end of the dog *F* out of engagement with the spiral groove and permit the weight *F'* to restore said dog to the incline position previously referred to clear of the shaft. The

further rotation of the eccentric causes the pawl to ride to the vanishing-point thereof, by which time the hanger will have become so lowered that the actuating-nut is again brought into engagement with the shaft A and the opposite traverse of the hanger and other parts effected. The arrangement of the eccentric, besides involving the other functions stated, provides for the reengagement of the actuating-nut unaccompanied by jar or vibration, as might be the case were the throwing off more abrupt.

In addition to the adjustability of the gage J the collar I and its parts can be adjustably secured at any point along the shaft H', so as to contribute to define the extent of traverse of the tracker-pin over the record-cylinder. The employment of the follower i^2 permits the collar and its parts to be nicely adjusted thereon before being clamped by the screw i^3 , since a very slight turning of the shaft H' in one direction or the other will occasion a correspondingly slight change in the longitudinal position of the collar and its parts, whereupon the same can be secured by the clamping-screw.

In lieu of the arrangement of eccentric-collar described I may employ an arrangement such as disclosed in Fig. 5, wherein the collar I³ is represented as being slightly tapering and longitudinally split, so that after its adjustment a tightening-ring I⁴ engaging its threads will positively secure it in position.

From the foregoing description it will be appreciated that the readjusting means embodying my invention are not only extremely simple and efficient in construction and operation, but are of such character that they constitute attachments readily applicable to all the existing constructions of phonographs with which I am familiar.

I do not desire to be understood as limiting myself to the particular features and details shown and described, but reserve the right to all modifications as may be fairly within the scope of my invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a normally inclined dog, adapted when in a vertical position to be engaged with the counter-shaft and be positively moved by and along the latter, said dog being capable for operable connection with the actuating-nut and resonator-arm, and provision for causing the dog to assume a vertical position and effect the inoperativeness of the nut and resonator-arm.

2. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a normally inclined dog adapted when in a vertical position to be positively moved along the latter, said dog being capable for operable connection with the actuating-nut and resonator-arm, provision for causing the dog to assume a vertical position and effect the inopera-

tiveness of the nut and the resonator-arm, and means for adjustably limiting the traverse of the dog with respect to the provision for causing it to assume a vertical position.

3. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a normally inclined dog adapted when in a vertical position to be engaged with said counter-shaft and be positively moved by and along the latter, said dog being capable for operable connection with the actuating-nut and resonator-arm, and provision longitudinally adjustable relative to the counter-shaft, for causing the dog to assume a vertical position and effect the inoperativeness of the nut and resonator-arm.

4. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a normally inclined dog adapted when in a vertical position to be engaged with said counter-shaft and be positively moved by and along the latter, said dog being capable of operable connection with the actuating-nut and resonator-arm, provision at the limit of the traverse of the dog in one direction for causing it to assume a vertical position and effect the inoperativeness of the nut and resonator-arm, and means at the opposite limit of the dog traverse for permitting the dog to assume an inclined position and enable the nut and arm to become operative.

5. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a vertically-movable hanger capable of operable connection with the actuating-nut and resonator-arm, a normally inclined dog carried by said hanger and adapted when in a vertical position to raise the hanger, and be positively moved by and along the counter-shaft, and provision for causing the dog to assume such vertical position.

6. In return-feed mechanism for phonographs, a revoluble return-feed shaft, a normally inclined dog adapted when in a vertical position to be engaged with said counter-shaft and be positively moved by and along the same, a pawl moving with the dog, the latter being capable of operable connection with the actuating-nut and the resonator-arm, and provision for alternately inclining the dog and engaging and throwing off the pawl to successively effect the inoperativeness of the nut and arm, the disengagement-dog with the counter-shaft, for permitting the nut and arm to become operative.

7. In return-feed mechanism for phonographs, a carrier and return-feed shaft revolvably mounted therein, a normally inclined dog adapted when in a vertical position to be engaged with said shaft and be positively moved by and along the same, said dog being capable of operable connection with the actuating-nut and resonator-arm, and provision on the carrier for causing said dog to assume a vertical position to effect the inoperativeness of the nut and arm.

8. In return-feed mechanism for phono-

graphs, a carrier and return-feed shaft revolvably mounted therein, a normally inclined dog adapted when in a vertical position to be engaged with said shaft and be positively moved by and along the same, said dog being capable of operative connection with the actuating-nut and resonator-arm, and a gage on said carrier, having provision for causing the dog to assume a vertical position to effect the inoperativeness of the nut and arm.

9. In return-feed mechanism for phonographs, provision for operable connection with the actuating-nut and resonator-arm, and means for causing said provision to render said nut and arm inoperative and for retractively moving said provision, a pawl G combined with said provision, and a device with which said dog engages to disengage the provision from retractive relation for permitting the nut and arm to become operative.

10. In return-feed mechanism for phonographs, provision for operable connection with the actuating-nut and resonator-arm, and means for causing said provision to render said nut and arm inoperative and retractively move said provision, a pawl G combined with said provision, and a revoluble eccentric with which said dog engages to disengage the provision from retractive relation for permitting the nut and arm to become operative.

11. In return-feed mechanism for phonographs, provision for operable connection with the actuating-nut and resonator-arm, and means for causing said provision to render said nut and arm inoperative and for retractively moving said provision, a pawl G combined with said provision, and a longitudinally-adjustable device with which said dog engages to disengage the provision from retractive relation for permitting the nut and arm to become operative.

12. In return-feed mechanism for phonographs, provision for operable connection

with the actuating-nut and resonator-arm, and means for causing said provision to render said nut and arm inoperative and for retractively moving said provision, a pawl G combined with said provision a revoluble collar carrying shoulders presenting a spiral eccentric and cam, said pawl adapted to engage said eccentric and be acted upon by the cam to disengage the provision from retractive relation and for permitting the nut and arm to become operative.

13. In return-feed mechanism for phonographs, a revoluble return-feed shaft having a spiral groove, provision, engaging said groove to be retractively moved by the revolution of the shaft, said provision adapted for operable connection with the actuating-nut and resonator-arm and capable of rendering the same inoperative when said provision is in retractive engagement, and a device for disengaging said provision from retractive engagement for permitting the arm and nut to become operative.

14. In return-feed mechanism for phonographs, a revoluble return-feed shaft having a spiral groove, a pivoted dog movable along said shaft and adapted for operative connection with the actuating-nut and resonator-arm, provision at one limit of the dog traverse for causing it to retractively engage the shaft-groove and render the nut and arm inoperative, and a device at the other limit of said traverse for disengaging the dog from its retractive relation for permitting the nut and arm to become operative.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 18th day of February, 1903.

GEORGE WOOD.

Witnesses:

B. PATTERSON,
J. GLEBA.

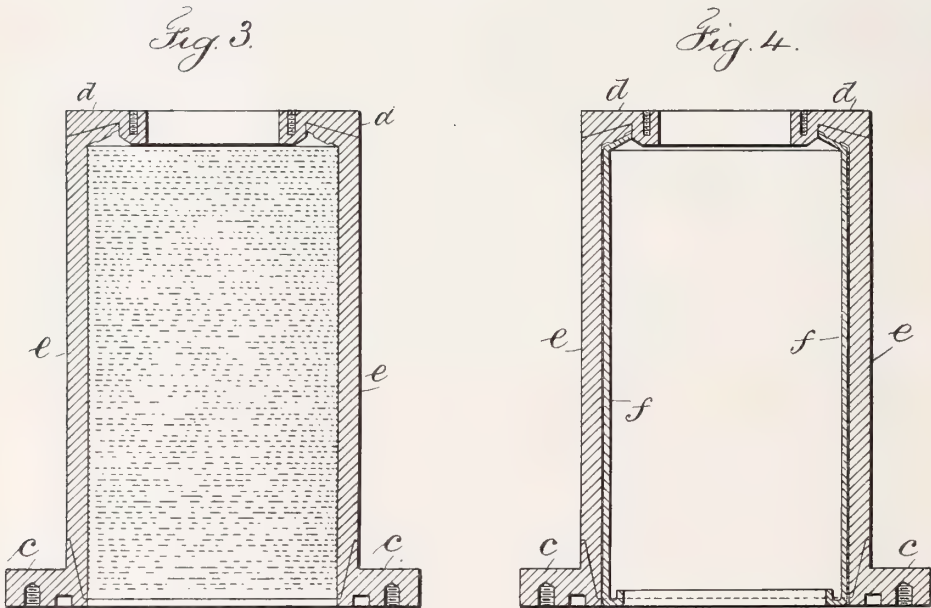
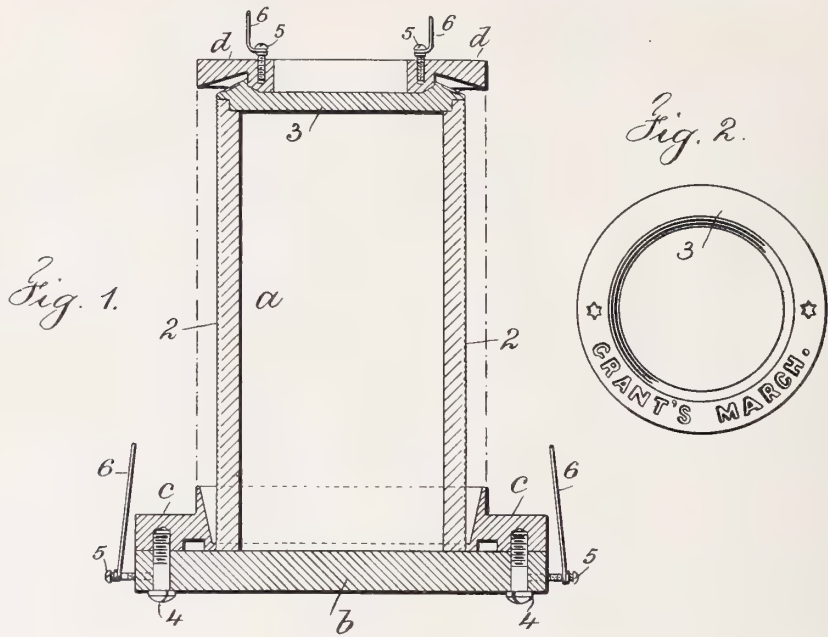
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A. N. PETIT.
METHOD OF FORMING METAL MATRICES FOR DUPLICATING
SOUND RECORD CYLINDERS.

APPLICATION FILED OCT. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

Charles Smith
J. Stail

Inventor

Adenor N. Petit.
for L. H. Lowell & Son attys

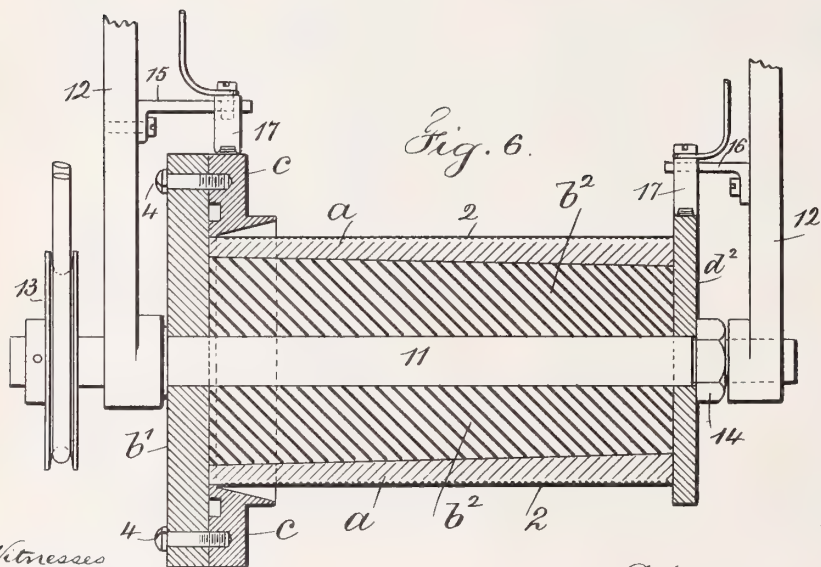
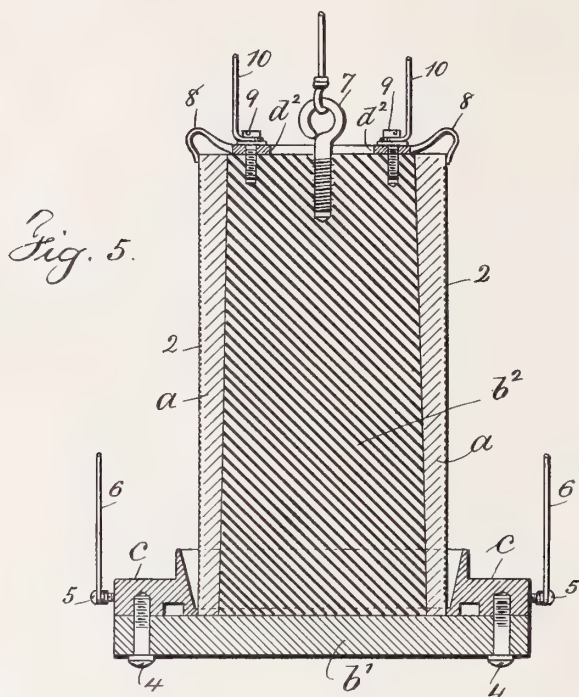
A. N. PETIT.

METHOD OF FORMING METAL MATRICES FOR DUPLICATING
SOUND RECORD CYLINDERS.

APPLICATION FILED OCT. 11, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses

Chas. N. Smith
J. Staib

Inventor

Adenor N. Petit.
J. W. Lurill & Son

Atty.

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF LIVERPOOL, ENGLAND, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

METHOD OF FORMING METAL MATRICES FOR DUPLICATING SOUND-RECORD CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 736,773, dated August 18, 1903.

Application filed October 11, 1902. Serial No. 126,863. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Liverpool, in the county of Lancaster, England, have
 5 invented an Improvement in the Methods of Forming Metal Matrices for Duplicating Sound-Record Cylinders, of which the following is a specification.

The object of my invention is to produce
 10 a superior matrix adapted to form a more perfect and commercial duplicate sound-record of cylindrical form and preferably made of celluloid than it has heretofore been possible to produce in an effort to overcome the
 15 harsh and grating sounds usually incident to records of sound in celluloid or similar material.

In carrying out my invention my improved method consists in applying to the surface
 20 of the wax master-record cylinder conductive material, providing a suitable base upon which the master sound-record cylinder thus treated is mounted, providing a ring of metal at one end thereof and connecting the same
 25 to a support, providing electric connections at the respective ends of the said master-record cylinder, and supporting the same in a bath or battery for the electrodeposition of metal upon the surface of said master-record
 30 cylinder and in contact with the ring end secured to the support. I may employ a second ring end at the opposite end of the master-record cylinder, so that the metal electrodeposited upon the surface of said master-record
 35 may join with both ring ends to form an integral or more complete matrix, and instead of simply supporting the master-record cylinder with the parts connected therewith in a quiescent condition in a bath or battery
 40 I have discovered that superior results are obtained by revolving the record during the electrodeposition of the metal, as the same obviates any tendency to granulation.

In the apparatus employed for carrying
 45 out my improved method I prefer to provide a suitable support for one end of the wax or other similar composition record, and one or both of the respective ends of the record are preferably surrounded by ring-like parts
 50 which form permanent portions of the matrix

and are connected by the metal electrodeposited upon the surface of the wax or other similar composition record. These ring-like ends are both peculiarly formed for this purpose, and I prefer to insert between one of
 55 these rings and one end of the wax cylinder a device carrying the name of the record and which afterward gives form to the cylindrical and duplicate sound-record formed in the matrix. The apparatus employed by me for
 60 carrying out the method herein described forms the subject of a separate application for Letters Patent filed May 15, 1902, Serial No. 107,454.

In the drawings I have shown an apparatus
 65 adapted for carrying out the method, in which—

Figure 1 is a vertical section showing the wax or other composition cylinder upon which is formed a master sound-record and the parts
 70 associated therewith preparatory to electrodepositing metal upon the surface thereof. Fig. 2 is a plan of the name or title ring. Fig. 3 is a vertical section of the matrix complete. Fig. 4 is a similar vertical section
 75 showing the celluloid blank placed within the matrix before the same is connected up in the apparatus shown and described in my application, Serial No. 107,453, filed May 15, 1902. Fig. 5 is a vertical section of a modified
 80 form of the invention, showing the parts assembled for insertion into the chemical bath for the electrodeposition of the metal; and Fig. 6 is a vertical longitudinal section of a modified form of the invention, showing the
 85 wax cylinder, upon which is a master-record suitably mounted for rotation in the chemical bath during the electrodeposition of the metal upon the surface thereof.

The wax cylinder *a* is of usual material
 90 and construction, with an engraved surface of a master sound-record, and the inner walls thereof may be parallel or tapering, as desired. The surface of this cylinder *a* is prepared with conductive material at 2. I provide a support or base *b* for use during the
 95 electrodeposition of metal, also a ring or annulus *c* of metal receiving the lower end of the wax cylinder *a* and a ring or annulus *d* of metal at the upper end of the wax cylinder
 100

der, said parts *c* and *d* forming limit-gages at the ends of the wax cylinder and also permanent ends for the matrix. The base *b* is provided with screws 4, passing through the same into interiorly-threaded openings in the ring or annulus *c*, whereby the two parts are removably connected. There are screws 5 in the base *b* and in the ring or annulus *d*, to which circuit-wires 6 are connected for conveying the electric current in the liquid bath or battery for the electrodeposition of the metal, and these circuit-wires 6 may also be suspending devices for said parts in said bath. The upper end of the wax cylinder *a* is preferably recessed, and I prefer to provide a name-plate 3, preferably of wax and adapted to fit into the upper end of the wax cylinder to close the same and also form a support and a centering structure for the metal ring or annulus *d*. This ring or annulus *d* is cut away on the under side from the periphery toward the center, so that when in place, as shown in Fig. 1, there is an appreciable space formed toward the axial center of the parts, said ring or annulus being of greater diameter than the wax cylinder *a*. The central opening of the ring or annulus *c*, receiving the lower end of the wax cylinder *a*, is outwardly flared or tapered, providing an annular wedge-shaped space between the surface thereof and the surface of the wax cylinder.

In forming the matrix in the bath by the action of the electric current the metal, such as copper, is not only deposited upon the conductive-material surface of the wax cylinder *a* and the surface of the name-ring 3, similarly prepared, but is also deposited upon the flared surface of the open center of the ring or annulus *c* and the under surface of the ring or annulus *d*, it being understood that the other metal surface of the associated parts are to be covered with varnish or some other material to prevent the electrodeposition of metal except at the places desired and hereinbefore stated. The metal is to be deposited until it assumes a thickness substantially agreeing with the diameter of the ring or annulus *d*, after which the electrodeposited cylinder *e*, with rings or annuli *c* *d*, form an integral structure which constitutes the matrix for further use and from which the wax cylinder, with the record, is broken out after removing the base or support *b*. This matrix is shown in Fig. 3, in which it will be noticed that the opening at the lower end is of the full diameter of the matrix, while the opening at the upper end is constructed and governed by the aperture in the ring portion *d*.

The celluloid blank *f* or blank of othersuitable material is preferably made with one end turned over and the other end inturned, and this blank is appreciably smaller than the internal diameter of the matrix and is passed into the same from the lower larger end, (see Fig. 4,) it being understood that the turned-over end of the blank comes against the upper

inclined portion of the matrix, at which place the matrix shows the name in relief.

In the modified form of my invention shown in Fig. 5 the base *b'*, similar to the base *b* hereinbefore described, is provided with a core *b²*, integral therewith or connected thereto, and both parts are preferably of insulating or non-conducting material, and to the same is advantageously secured a screw-eye 7, from which the parts collectively are advantageously suspended in the bath or battery during the electrodeposition of metal. In this figure the wax cylinder *a* with a conductive-material surface, the ring or annulus *c*, and the screws 4 are the same as the parts hereinbefore described. Upon the upper end of the core *b²*, I secure a ring *d²* or its equivalent structure provided with several radiating fingers 8, made integral therewith and extending over upon the upper surface of the wax cylinder *a*, in contact with its conductive surface. This ring is preferably fastened to the core by screws 9, which also serve as binding-posts for the circuit-wires 10. Secured to the ring or annulus *c* are screws 5 and circuit-wires 6, similar to those parts employed in Fig. 1, the screws 5 and wires 6 and the screws 9 and wires 10, together with the ring *d'* and the fingers 8, constituting devices for a complete electric circuit through the annulus *c* and the conductive-material surface 2 of the cylinder.

In the modified form Fig. 6 the base *b'* and the core *b²* are centrally perforated for a shaft 11, the same being rotatably hung in arms 12, suspended from any fixed point, said shaft being provided with a nut 14 to clamp the base *b'* and core *c²* to the shaft and between a collar thereon and said nut, and on this shaft is preferably placed a pulley 13, surrounded by a band for rotating the shaft, the base *b'*, core *b²*, the ring or annulus *c*, secured thereto by the screws 4, the wax cylinder *a*, surrounding the core *b²*, and a ring *d²*, placed against the right-hand end of the core *b²* and held thereto by the clamping of the nut 14. The said ring *d²* substantially agrees in diameter with the full diameter of the finished matrix, and in order to bring to the ring *d²* and the ring or annulus *c* the electric current in suitable form I provide brackets 15 16 upon the arms 12 and spring-contacts 17, which run upon the surfaces or peripheries of said ring or annulus *c* and the ring *d²* during the rotation of the parts in the bath or battery. The arms 12 are to be constructed for the ready separation therefrom of the base *b'*, core *b²*, and base connected therewith, so that the finished matrix may be removed and the wax cylinder broken out therefrom.

The matrix made as hereinbefore described is substantial, strong, and lasting and eminently adapted for continuous and repeated use in the manufacture of duplicate sound-records of celluloid or othersuitable materials.

I have discovered that in the electrodeposition of the metal upon the surface of the master-record when the same is in the bath

the best results are obtained by starting the operation with one circuit-wire at one end until a substantial or appreciable thickness is obtained, because the electric action is continuous from one end to the other, whereas when two circuit-wires are employed the action of deposition is from both ends to the center. This latter manner of operation is satisfactory after the appreciable foundation is made, whereas if the action is commenced with two wires there will be an appreciable central line as a result, which is consequently detrimental.

I claim as my invention—

1. The method of forming the matrix of metal for the production of duplicate sound-record cylinders of celluloid or similar material, the same consisting in applying to the surface of the wax record-cylinder conductive material, placing the same between metal ring ends or annuli, electrodepositing metal upon the surface of the wax or master-record cylinder and upon adjacent surfaces of said ring ends until the metal deposited and the ring ends are formed into an integral matrix, substantially as set forth.

2. The method herein described of forming a matrix of metal for the purpose of producing duplicate sound-record cylinders, the same consisting in applying to the surface of the wax master-record cylinder conductive material, placing the same between metal ring ends or annuli upon a suitable support, providing electric connections therefor, rotating the said parts in a bath or battery and simultaneously electrodepositing metal upon the surface of the master wax record-cylinder and upon the adjacent surfaces of said ring

ends until the metal deposited and the ring ends are formed into an integral matrix, substantially as set forth.

3. The method herein described of forming a matrix of metal for the purpose of producing duplicate sound-record cylinders, the same consisting in applying to the surface of the wax master-record cylinder conductive material, mounting the said master sound-record cylinder upon a suitable base, placing a ring of metal at one end thereof and connecting the same to said support, providing electric connections at the respective ends of the said master-record cylinder and supporting the same in a bath or battery and simultaneously electrodepositing metal upon the surface of said master-record cylinder and in contact with the ring end secured to the support, substantially as specified.

4. The method herein described of forming a matrix of metal for the purpose of producing duplicate sound-record cylinders, the same consisting in applying to the surface of the wax master-record cylinder conductive material, placing the same between metal ring ends or annuli upon a suitable support, providing electric connections therefor, rotating the said parts in a bath or battery and simultaneously electrodepositing metal upon the surface of the master wax record cylinder and ring ends or annuli, substantially as set forth.

Signed by me this 23d day of September, 1902.

ADEMOR N. PETIT.

Witnesses:

RICHARD HEILBORN,
H. WATSON.

736,948.

No. 736,948.

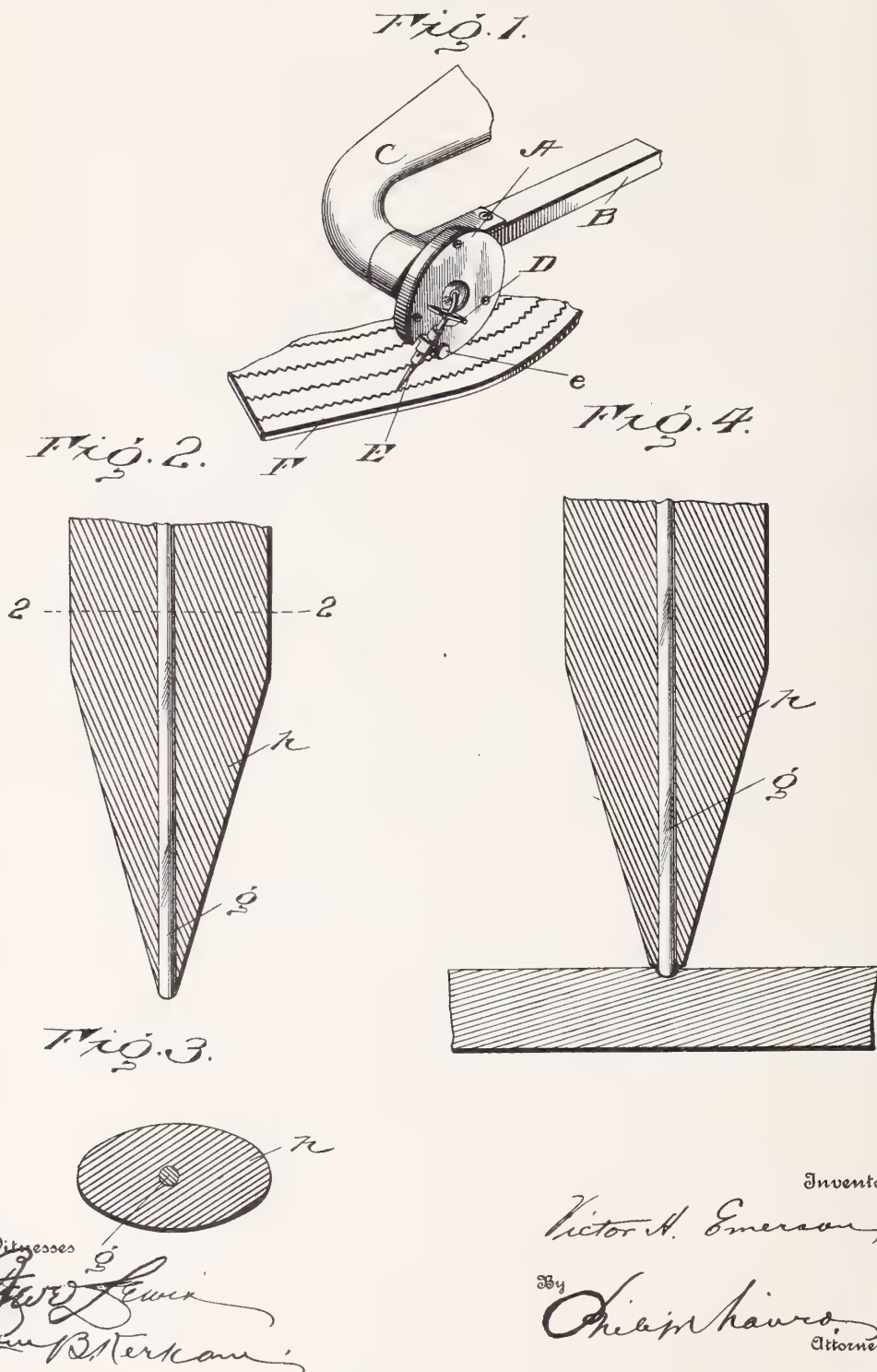
PATENTED AUG. 25, 1903.

V. H. EMERSON.
STYLUS OR NEEDLE FOR SOUND REPRODUCERS.

APPLICATION FILED JUNE 27, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



No. 736,948.

PATENTED AUG. 25, 1903.

V. H. EMERSON.
STYLUS OR NEEDLE FOR SOUND REPRODUCERS.

APPLICATION FILED JUNE 27, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 5.

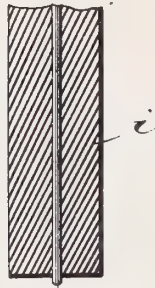


Fig. 7.



Fig. 9.



Fig. 6.



Fig. 8.



Fig. 10.

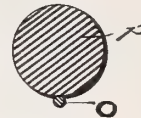


Fig. 11.

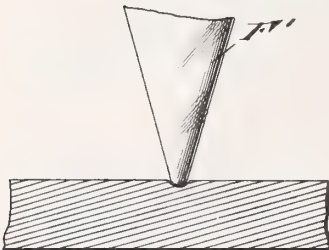
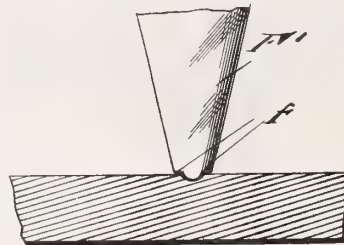


Fig. 12.



Inventor

Witnesses
E. J. Lewis
per B. Kerkham

Victor H. Emerson,
By Philip Mauro,
Attorney

UNITED STATES PATENT OFFICE.

VICTOR H. EMERSON, OF NEWARK, NEW JERSEY, ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

STYLUS OR NEEDLE FOR SOUND-REPRODUCERS.

SPECIFICATION forming part of Letters Patent No. 736,948, dated August 25, 1903.

Application filed June 27, 1902. Serial No. 113,431. (No model.)

To all whom it may concern:

Be it known that I, VICTOR H. EMERSON, a resident of Newark, New Jersey, have invented a new and useful Improved Stylus or Needle for Sound-Reproducers, which invention is fully set forth in the following specification.

In reproducing sound from flat-disk records, in which the sound-waves are represented by lateral undulations in a groove of even depth formed in a flat disk of rubber composition or similar hard substance, a pointed stylus-needle composed entirely of a hard metal, such as steel, has heretofore been employed to track the record and transmit vibrations to the diaphragm. This pointed stylus or needle is removably secured in the end of a stylus-arm, which communicates the vibrations to the diaphragm by a lever-like action. Although the fine point of the stylus or needle is at first sufficiently sharp to engage in the groove and between the side walls thereof, said point rapidly wears away until a part of the conical or tapered point is reached which is of greater diameter than the width of the groove. The result is that shoulders are formed which rest and bear upon the upper flat face of the record contiguous to the groove. As is well known an objectionable sharp grinding, grating, gritting, or scraping noise accompanies the sound reproduced from records of the type above referred to, due to the hard metal of the stylus or point bearing against and riding over the surface of the hard substance composing the record-disk. This noise, which is not so objectionable when the reproduction is commenced with a fresh finely-pointed stylus or needle, becomes louder and more objectionable as the point is rapidly worn away and the shoulders above referred to formed thereon. Effort has been made to minimize this objectionable noise by frequent changes of the stylus or needle; but this is an unsatisfactory expedient, being not only tedious, but ineffectual, the sharp point of the stylus being very materially worn away before the reproduction of a single record has been completed. It is impracticable to reduce the stylus or needle to a uniform diameter approximating the width of

the groove, because it would not then have sufficient rigidity to properly transmit vibrations from the record-groove to the diaphragm.

The object of my present invention is to overcome or at least to minimize the objectionable noise above referred to, at the same time avoiding the necessity of frequent changes of the stylus or needle.

To that end the invention comprises a stylus or needle having a hard core which is supported by, surrounded by, incased, or embedded in a support, body, or covering of softer material. The core, at least at its end which engages the record-groove, is of a uniform diameter approximating the width of the record-groove and is preferably made of hard steel, though other suitable metal or material may be employed. Fine piano-wire has given good practical results. The support, body, or covering, which is of sufficient thickness or dimensions to impart to the stylus the required rigidity, is made of a softer metal or material than the core, so that it will be readily worn away by contact with the record disk or tablet without producing objectionable noise. An alloy composed of equal parts of bismuth and lead has been found to give good results.

The invention will be more fully understood by reference to the accompanying drawings, wherein—

Figure 1 is a perspective view showing part of a record-disk, a reproducer, and associated parts. Fig. 2 is a longitudinal sectional view through a stylus or needle embodying my invention. Fig. 3 is a transverse section on line 3 3 of Fig. 2. Fig. 4 is a sectional view showing my improved stylus in engagement with a record-groove. Figs. 5 to 10, inclusive, are views in section and elevation, illustrating other forms in which the invention may be embodied; and Figs. 11 and 12 are views showing a stylus or needle such as heretofore used in engagement with a record-groove. Figs. 2, 3, 4, 11, and 12 are drawn on a much-enlarged scale, the ordinary dimensions of the sound-groove shown in several of the figures being about five one-thousandths ($\frac{5}{1000}$) of an inch in width by two

one-thousandths ($\frac{2}{1000}$) of an inch in depth. Figs. 5 to 10 are also enlarged views, but on a smaller scale.

Referring to Fig. 1, A is a reproducer 5 mounted on the outer end of arm B, which is supported at its other end (not shown) on a universal joint. C is a portion of the horn leading into the reproducer. D is the stylus-arm of the reproducer, and E is the stylus or 10 needle removably secured in the outer end of the stylus-arm by a set-screw *e*. The stylus or needle engages and tracks the grooves in the sound-record F, said grooves having lateral undulations corresponding to 15 sound-waves.

In Fig. 11, F is the point of the ordinary pointed steel stylus now commonly used, showing its condition when the operation of reproduction begins. Fig. 12 is a similar view 20 showing the condition of the point after it has been in operation for a short time. The point has worn away, forming shoulders *ff* at opposite sides thereof. These shoulders bear upon the upper flat face of the record-disk contiguous to the groove, thereby greatly 25 increasing the objectionable sharp scratching, grating, or gritting noise, as above explained.

As shown in Figs. 2, 3, and 4, my improved 30 stylus comprises a core *g*, preferably of hard-steel wire (such as piano-wire) of a uniform diameter approximating the width (ordinarily five one-thousandths of an inch) of the record-groove, so that no matter how much 35 the end of the core is worn away it will continue to engage between the side walls of the groove. *h* is a support of softer material, preferably an alloy of equal parts of bismuth and lead, surrounding the core and impart- 40 ing to the stylus or needle the required rigidity. The covering may be applied to the core either by dipping it into the alloy while the latter is in a liquid molten state or by molding. As shown in Figs. 2, 3, and 4, the 45 support or covering is elliptical in cross-section, the greatest diameter thereof being preferably disposed transversely to the groove. These figures also show the lower 50 end of the covering tapered to the lower end of the core, so that the latter will readily engage the groove at the beginning of the operation. As will be readily understood, as 55 the end of the core is worn off the support or covering of softer material will also be readily worn away, as indicated, for example, in Fig. 4, the character of the covering being such that no appreciable sound will result from the wear thereon. The stylus or needle thus constructed can be repeatedly used. In 60 fact, it can be used as long as a sufficient length thereof projects from the stylus-arm.

In Figs. 5 and 6 the covering *i* is cylindrical and of uniform diameter throughout.

It is not necessary that the core be embed- 65 ded in the center of or be entirely surrounded by the support. Figs. 7 and 8 show the core *m* embedded in the support at the pe-

riphery of the latter, while Figs. 9 and 10 show core *o* soldered to the peripheral surface of the support *p*.

As will be apparent, modifications may be made within wide limits without departing from the invention. 70

The term "core" as used in the specification and claims is intended to designate the 75 hard part of the needle irrespective of whether it is surrounded by and embedded in the softer support, body, or covering or merely secured to the support in such manner as not to be surrounded thereby. 80

What I claim is—

1. A stylus or needle for use in sound-reproducing instruments composed of a hard core and a support or body of softer material extending along and secured to the core. 85

2. A stylus or needle for use in sound-reproducing instruments composed of a hard-wire core and a body or support of softer material extending along and secured to the core.

3. A stylus or needle for use in sound-reproducing instruments composed of a core of hard metal and a body or support of softer metal extending along and secured to the core. 90

4. A stylus or needle for use in sound-reproducing instruments composed of a hard core 95 and a support or body of softer material extending along and in which the core is embedded.

5. A stylus or needle for use in sound-reproducing instruments composed of a hard-metal 100 core and a support or body of softer metal extending along and in which the core is embedded.

6. A stylus or needle for use in sound-reproducing instruments composed of a hard core 105 and a support or covering of softer material extending along and surrounding the core.

7. A stylus or needle for use in sound-reproducing instruments composed of a hard-metal core and a support or covering of softer metal 110 extending along and surrounding the core.

8. A stylus or needle for use in sound-reproducing instruments composed of a hard-metal core and a support of softer metal containing lead extending along and secured to the core. 115

9. A stylus or needle for use in sound-reproducing instruments composed of a hard-metal core and a support or body of bismuth-lead alloy extending along and secured to the core.

10. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard core of a thickness approximating the width of the groove, and a support of softer material secured to the core. 120

11. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard core of a thickness approximating the width of the groove and a support of softer material in which 125 the core is embedded.

12. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard core of a thick-

ness approximating the width of the groove and a support of softer material surrounding the core.

13. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard-metal core of a thickness approximating the width of the groove and a support of softer material for the core.

14. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard-metal core of a thickness approximating the width of the groove embedded in a support of softer metal.

15. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard-metal core of a thickness approximating the width of the groove surrounded by a support of softer metal.

16. A stylus or needle for use in reproducing sound from a groove containing a record thereof comprising a hard-steel core of a thickness approximating the width of the record-groove surrounded by a covering of softer metal.

17. A stylus or needle for use in reproducing sound from a groove containing a record thereof comprising a hard-steel core of a thickness approximating the width of the record-groove surrounded by a covering of bismuth-lead alloy.

18. The combination with a record-surface having a groove therein containing a record of sound, of a reproducer stylus or needle composed of a hard core adapted to engage in the groove and a support of softer material for the core adapted to bear upon the surface of the record adjacent to the groove.

19. The combination with a record-surface having a groove therein containing a record of sound, of a reproducer stylus or needle composed of a hard core adapted to engage in the groove and a support of softer material for the core adapted to bear upon the surface of the record at opposite sides of the groove.

20. A stylus or needle for use in reproducing sound from a groove containing a record thereof, comprising a hard-metal wire core of a diameter approximately the width of the record-groove adapted to engage at one end in the groove and a body or support of softer material along and in which the core is embedded and adapted to be readily worn away by contact with the record-tablet.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

VICTOR H. EMERSON.

Witnesses:

ELISHA K. CAMP,
C. A. L. MASSIE.

737.733

Green

No. 737,733.

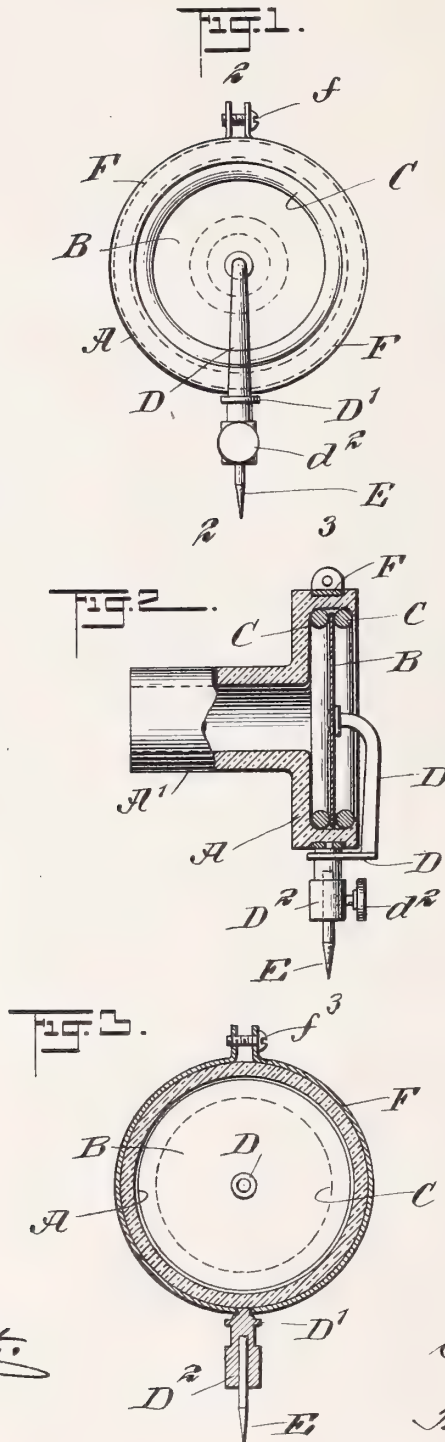
PATENTED SEPT. 1, 1903.

E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED FEB. 9, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

Julius K. Smith.
John Lotka

INVENTOR

Edward D. Gleason

BY

Brown & Thwaites
ATTORNEYS

No. 737,733.

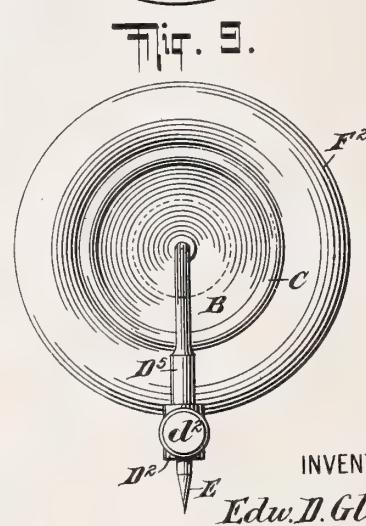
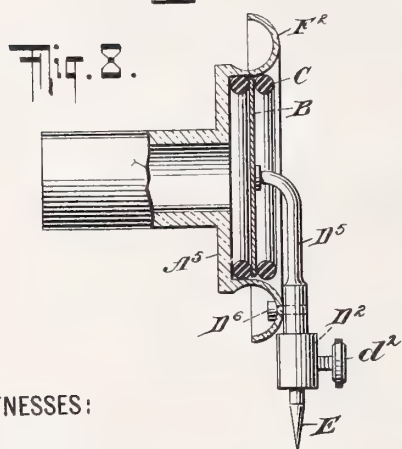
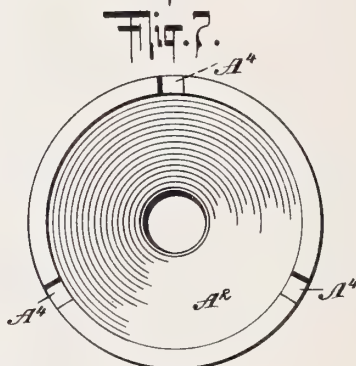
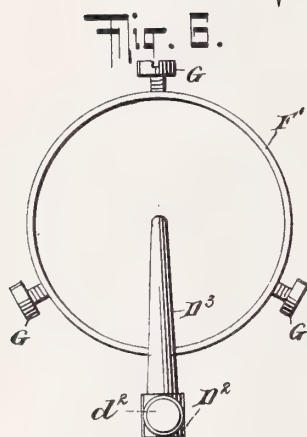
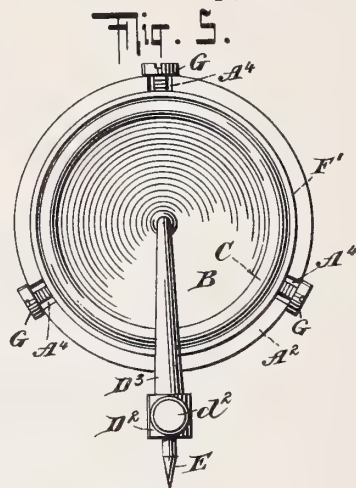
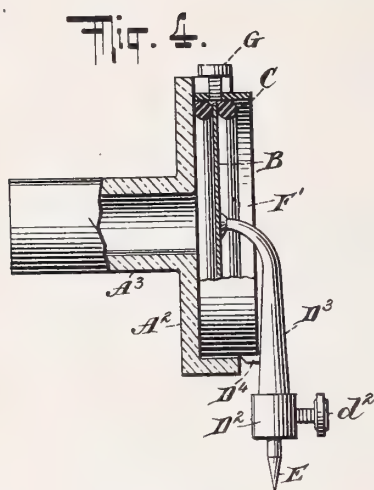
PATENTED SEPT. 1, 1903.

E. D. GLEASON.
SOUND BOX FOR TALKING MACHINES.

APPLICATION FILED FEB. 9, 1903.

2 SHEETS—SHEET 2.

NO MODEL.



WITNESSES:

John A. Kehlmeier
John Lotka

INVENTOR

Edw. D. Gleason

BY

Brown & Munn
ATTORNEYS

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
REGINA MUSIC BOX COMPANY, OF NEW YORK, N. Y., A CORPORATION
OF NEW JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 737,733, dated September 1, 1903.

Application filed February 9, 1903. Serial No. 142,469. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, residing in the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Boxes for Talking-Machines, of which the following is a specification.

My invention relates to sound-boxes for talking-machines, and has for its object to provide a simple structure by which the sound will be reproduced with great clearness and loudness.

To this end I employ a specific novel construction of the sound-box proper or casing, and I also provide improved means for supporting the arm which transmits the vibrations of the diaphragm to the stylus.

The invention will be fully described hereinafter, and the features and novelty pointed out in the appended claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a face view of a sound-box provided with my improvement. Fig. 2 is a longitudinal section of the same on line 2 2 of Fig. 1. Fig. 3 is a cross-section on line 3 3 of Fig. 2. Fig. 4 is a longitudinal section, and Fig. 5 a face view, of another form of my invention. Fig. 6 illustrates the stylus-arm and its support. Fig. 7 is a face view of the sound-box proper. Fig. 8 is a longitudinal section of still another form of my invention, and Fig. 9 is a face view thereof.

As illustrated in Figs. 1, 2, and 3, the sound-box proper, A, with its tubular extension A', is made of glass, as I have found that this material possesses marked advantages in the production of a clear non-metallic sound. B is the diaphragm, which, as usual, is set between rubber rings C, fitted into a corresponding recess in the face of the sound-box proper or casing, A. With the center of the diaphragm is connected the stylus-arm D, which has a plate or bracket D', through the medium of which it is connected with an elastic stylus-support F. This support, as shown, consists of a spring-band laid into a groove on the outer surface of the casing A and provided at its ends with suitable means for fas-

tening it and for varying the tension. As a convenient means for this purpose I have shown a clamping-screw f, preferably located at a point diametrically opposite to that at which the connecting-plate D' is arranged. From this connecting-plate extends outwardly the stylus-holder D², adapted to receive the stylus E, held in position by a set-screw d² or other suitable means.

In the form of construction illustrated by Figs. 4 to 7, inclusive, the casing A², with its tubular extension A³, is again preferably made of glass and is provided with a number of slots A⁴, arranged radially and adapted to receive the stems of screws G; the inner ends of which screw into an annular spring F'. It will be understood that as the heads of the screws abut against the outer surface of the casing A² the tension of the spring may be varied by turning said screws. The spring surrounds the diaphragm B and its holding-rings C and acts, moreover, as a support for the stylus-arm D³, which is connected with said spring at D⁴. The stylus-holder D³ may be of substantially the same construction as hereinbefore described.

In Figs. 8 and 9 the spring F², which forms the support for the stylus-arm D⁵, is an integral part of the casing A⁵, the outer edge of said casing being bent into the shape of a concave ring, so that it may have an elastic action. The connection of the stylus-arm D⁵ with the spring F² is effected in any suitable manner—for instance, by means of a pin D⁶.

It will be seen in each case the stylus-arm is supported upon a spring, which spring is of annular shape and surrounds the diaphragm, being either directly adjacent thereto, as in Figs. 4 and 8, or separated therefrom by a portion of the casing, as in Fig. 2. In Figs. 1 to 7 provision is made for varying the tension of the spring-support. Furthermore, in these constructions the spring-support is removable from the sound-box, together with the stylus-arm.

My improved sound-box is very efficient in rendering sound with great distinctness and free from unpleasant metallic noise.

While I prefer to make the sound-box proper of glass, it will be understood that



some of the features of my invention are applicable to sound-boxes made of other material.

I claim as my invention—

- 5 1. A sound-box for talking-machines, provided with a diaphragm, an annular spring elastic in a plane parallel to that of the diaphragm, and a stylus-arm supported on said spring and connected with the diaphragm.
- 10 2. A sound-box for talking-machines, comprising a diaphragm, an annular spring located in the same plane with the diaphragm and elastic in said plane, and a stylus-arm supported on said spring and connected with
- 15 the diaphragm.
3. A sound-box for talking-machines provided with a diaphragm, an annular spring located in substantially the same plane as the diaphragm and adapted to yield elastic-
- 20 ally in said plane, and a stylus-arm support-

ed on said spring and connected with the diaphragm.

4. A sound-box for talking-machines provided with a casing, an annular spring, means for adjusting the tension of said spring, 25 a diaphragm, and a stylus-arm supported on said spring and connected with the diaphragm.

5. A sound-box for talking-machines provided with a diaphragm, an annular spring 30 surrounding the same, and a stylus-arm supported on said spring and connected with the diaphragm.

In testimony whereof I have signed my name to this specification in the presence of 35 two subscribing witnesses.

EDWARD D. GLEASON.

Witnesses:

JAMES S. PHILLIPS,
JOHN P. JONES.

1738.316

No. 738,316.

PATENTED SEPT. 8, 1903.

E. GILBERT.
ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED DEC. 18, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

FIG. 1

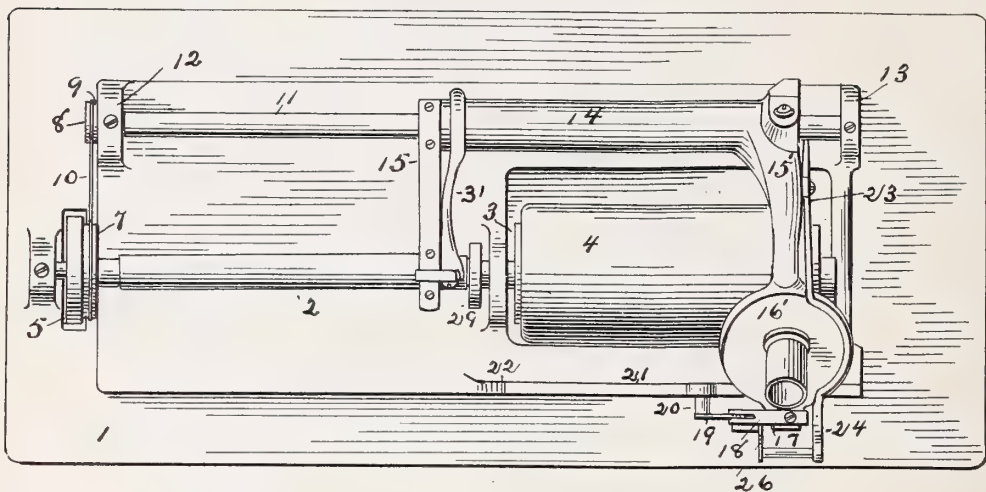


FIG. 2

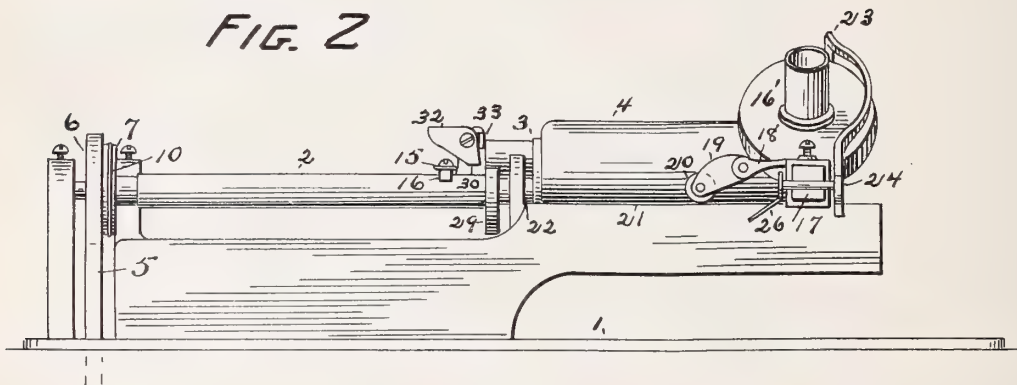
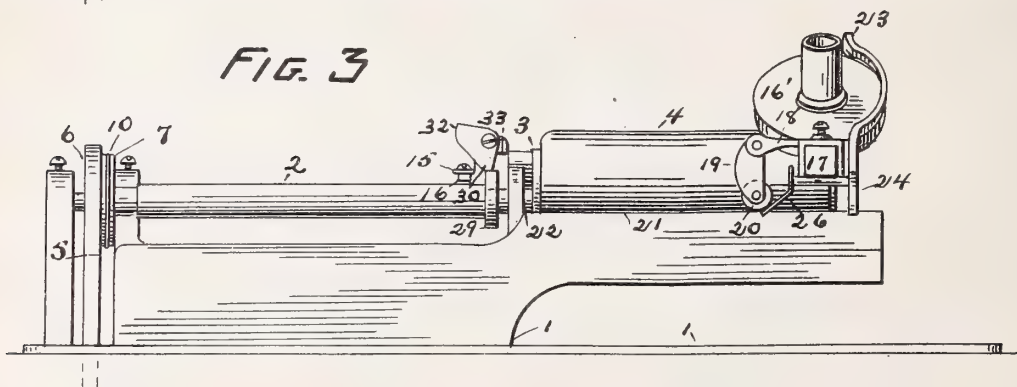


FIG. 3



WITNESSES:

Walter F. Vane!
Leon Boillot

INVENTOR:
E. Gilbert
by N. A. Acker
This Atty.

E. GILBERT.
ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED DEC. 18, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

FIG. 4

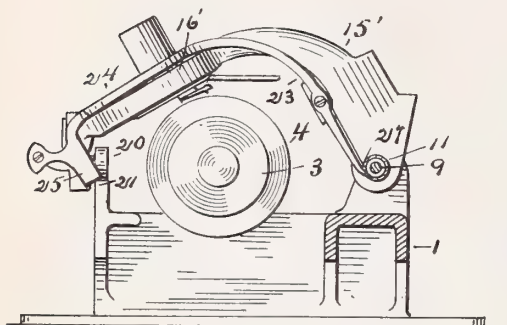


FIG. 5

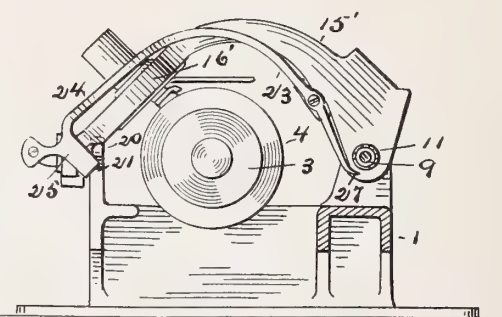


FIG. 7

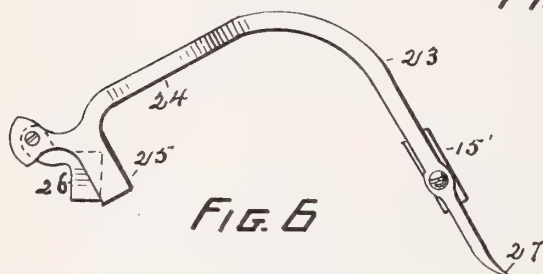


FIG. 6

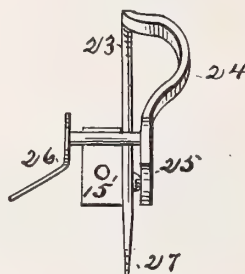


FIG. 8

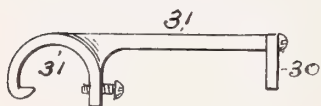


FIG. 9

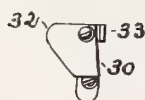


FIG. 10



FIG. 11

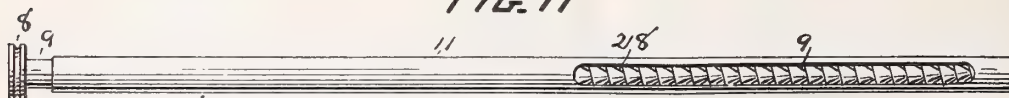


FIG. 12

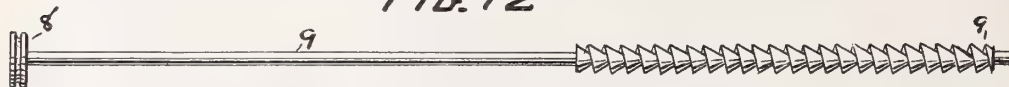
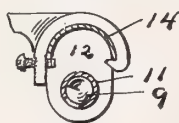


FIG. 13



WITNESSES:

Halter T. Vane.

Leon Boillot

INVENTOR:

Elam Gilbert
by W. A. Acker
his atty.

UNITED STATES PATENT OFFICE.

ELAM GILBERT, OF PORTLAND, OREGON.

ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 738,316, dated September 8, 1903.

Application filed December 18, 1902. Serial No. 135,690. (No model.)

To all whom it may concern:

Be it known that I, ELAM GILBERT, a citizen of the United States, residing at Portland, county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Attachments for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention comprises certain new and useful attachments which may be readily secured to phonographs at present in use or which form a portion of the machine as delivered from the factory, the object of the invention being to provide means whereby the sound-producer or diaphragm mechanism is caused to automatically return to its starting-point after having traveled the length of the record to be reproduced, thereby permitting the machine to repeat its record any desired number of times.

The invention resides more particularly in the adaptability of the attachments to existing machines without the necessity of making material changes or alterations.

To comprehend the invention, reference should be had to the accompanying drawings, wherein—

Figure 1 is a plan view of an ordinary phonograph with the attachments applied thereto, the oscillating finger being shown as about to engage the cam-collar to lift the diaphragm or reproducer head. Fig. 2 is a front view in elevation of the mechanism disclosed by Fig. 1 of the drawings. Fig. 3 is a view similar to Fig. 2 of the drawings, illustrating the oscillating finger engaged with the cam-collar and the diaphragm or reproducer head raised for return to its starting-point. Fig. 4 is an end view in elevation of the mechanism in the position illustrated by Fig. 3 of the drawings viewed from the receiving end of the record-cylinder. Fig. 5 is a similar view disclosing the mechanism in the position illustrated by Fig. 2 of the drawings. Fig. 6 is a detail view of the fulcrumed lever which engages with the worm-shaft for returning the diaphragm or reproducer head to its starting-point. Fig. 7 is an end view in elevation of said lever viewed from its forward end. Fig. 8 is a detail side view of the arm which carries the oscillating finger. Fig. 9 is an end

view thereof. Fig. 10 is a detail view of the cam-collar. Fig. 11 is a detail view of the sleeve for the diaphragm or reproducer head traveler, disclosing the worm-shaft therein for the return of said head. Fig. 12 is a detail view of the said worm-shaft; and Fig. 13 is a cross-sectional view of the said worm-shaft, sleeve, and traveler working thereon.

The numeral 1 is used to indicate the bed of an ordinary Edison home phonograph, within bearings of which works the worm or feed shaft 2 of the record-cylinder. This shaft at one end carries the record cylinder 3, upon which fits the record 4 to be reproduced. The worm cylinder-shaft 2 is driven from the operating mechanism by means of the belt 5, working over pulley 6, attached to said shaft. These parts and their arrangement are the same as ordinarily constructed. Hence no specific description thereof is required in connection with this application.

To the worm or feed shaft 2 is attached a drive-pulley 7, which is connected to a smaller pulley 8, attached to the inner end of worm-shaft 9 by means of crossed belt 10. This worm-shaft 9 works within bearings of and is hidden from view by the sleeve 11, which sleeve is parallel with worm-shaft 2 and is held between supporting-brackets 12 13, upwardly projecting from the bed 1 of the phonograph. By reason of the crossed-belt connection 10 between pulleys 7 and 8 an opposite rotation or movement is imparted to the worm-shaft 9 to that given to the worm-shaft 2 of the record-cylinder 3.

Upon the sleeve 11 works the traveler 14, from one end of which projects laterally the feed-arm 15, which carries at its free end the feed-nut 16. This nut works in the threads of the worm or feed shaft 2, which serves as a feed-shaft, and causes the traveler 14 to move outwardly upon the sleeve 11 during rotation of the said worm or feed shaft 2.

From the outer end of the traveler 14 projects the diaphragm-arm 15', which supports the diaphragm or reproducer head 16' immediately above the record 4.

To an extension 17 of the diaphragm or reproducer head is attached an arm 18, to which is hinged a depending lever 19. This lever carries a roll 20, which rides or travels along

the track edge 21 of the phonograph-bed 1. Said edge 21 is a slight distance above the bed 1, starting from point 22.

To the diaphragm-arm 15⁴ is fulcrumed the lever 23, the forward end 24 of which is downwardly curved and formed with an inwardly-projecting extension 25, which extension rests against the edge 21 of the bed 1. Said lever is also formed with a stop 26, which when the diaphragm or reproducer is raised clear of the record 4 prevents the lever 19, with its roll 20, moving or falling from a vertical position during the return travel of the reproducer or diaphragm head 16.

The rear end 27 of the fulcrumed lever 23, which is overbalanced by the weight of the forward portion, is slightly upwardly turned, so as to fit through the longitudinal slot 28 cut in the under face of the sleeve 11, and engages with the threads of the return worm-shaft 9 when the diaphragm or reproducer head has been lifted clear of the record 4, as will be hereinafter explained.

To the inner end portion of the worm or feed shaft 2 is secured a cam-collar 29, which during the operation of the machine serves to operate the oscillator or oscillating finger 30. This oscillating finger is hinged to the free end of arm 31, secured to and projecting from the traveler 14. The upper enlarged portion 32 of the finger 30 overcomes the weight of the said finger and tends to throw the same in a direction toward the record-cylinder. This outward movement of the hinged finger 30 is limited by the stop 33, attached to the arm 31. Said oscillating finger 31 is held a slight distance above the feed-arm 15, so as to be in position to move onto the lowermost portion of the cam-collar 29.

During the operation of the machine the traveler 14 is moved forward to carry the reproducer or diaphragm head, with its reproducer, over the face of the rotating record 4 by the feed-nut 16 working in the threads of the driven worm or feed shaft 2. As the feed-arm 15 approaches the end of its outward travel the oscillating finger bears against the face of the rotating cam-collar 29, being gradually forced inward until the lowermost portion of the cam-collar is brought into line with lower end of the oscillating finger, when the weight of the enlarged head portion 32 throws the said oscillating finger outward its full distance onto the upper surface thereof. The said finger rides upon the said surface, being gradually raised by the inclination of the cam-collar to raise or lift the arm 31 in order to turn upward the traveler 14 and raise the diaphragm or reproducer head clear of the record 4. As the diaphragm or reproducer head 16¹ is raised, so that its reproducing-needle clears the surface of the record 4, the forward end of the fulcrumed lever 23, overbalancing its rear end portion, throws the upwardly-curved end 27 into the longitudinal slot 28 of sleeve 11, so as to be placed into engagement with the worm-shaft 9 for the re-

turn of the diaphragm or reproducer head. At the same time the weight of roll 20 throws the depending lever 19 into a vertical position, which places the roll 20 onto the track edge 21 at right angles thereto. The weight of the diaphragm or reproducer head and its associate mechanism is thus transferred to the roll 20, which supports same clear of the record 4. The roll 20 is prevented from moving outward during the return of the diaphragm or reproducer head 16¹ by reason of the stop 26, against which the lower portion of the lever 19 bears.

Inasmuch as an opposite rotation is imparted to the return worm-shaft 9 to that given to the feed or worm shaft 2, it is obvious that when end 27 of lever 23 engages with the threads thereof the same, together with the diaphragm or reproducer head 16¹, arm 15¹, traveler 14, and feed-arm 15, will be carried inwardly or in a direction the reverse to that given by the worm or feed shaft 2 until the said diaphragm or reproducer has reached its starting-point at the inner end of the record 4. By this time the end 27 of lever 23 will have traveled approximately the full length of the thread of the worm-shaft 9, it being thrown out of engagement therewith by reason of the roll 20 being carried beyond the starting-point 22, as carried beyond this point the roll 20 drops below the surface of the track edge 21 and permits of the reproducer or diaphragm head lowering to place its reproducer onto the record 4. The weight of this head 16¹ overcoming that of the forward end portion of lever 23 causes the upward movement thereof, which lowers the rear end 27 and moves same from engagement with the worm-shaft 9.

With the lowering of the diaphragm or reproducer head the traveler 14, feed-arm 15, and feed-nut 16 are restored to their normal position for again operating to cause reproduction of the record.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. In a phonograph, a feed-shaft having a record-cylinder actuated thereby, a cam secured to the said shaft, a reproducer provided with means for moving same outwardly over the cylinder-record, an oscillator pivoted to and carried by the moving means for the reproducer, said oscillator being arranged to overlie and engage with the cam-collar to raise the reproducer clear of the record upon the termination of its outward movement, of mechanism whereby the reproducer when raised is moved in an opposite direction to that when lowered, and devices for supporting the reproducer when raised and automatically lowering the same upon the completion of its return stroke.

2. In a phonograph, a feed-shaft, a cam secured thereto, an oscillator pivoted to swing longitudinally of the feed-shaft and arranged to be actuated by said cam to raise the reproducer clear of the phonograph-record upon

completion of its outward travel, and means whereby the reproducer when raised is automatically moved to its starting-point and lowered upon completion of its return stroke.

5 3. In a phonograph, a feed-shaft, a stationary slotted sleeve, a return worm-shaft working therein, means whereby said shaft is driven in an opposite direction to that of the feed-shaft, mechanism for raising the repro-
10 ducer of the phonograph at the end of its outward stroke, means actuated by return worm-shaft whereby the reproducer is restored to its starting-point, and devices for supporting the reproducer in its raised position during its return movement and auto-
15 matically lowering the same when its starting-point has been reached.

4. In a phonograph, the combination with the feed-shaft, of a return worm-shaft, means
20 for driving said shaft in an opposite direction to that of the feed-shaft, a traveler slidable upon the slotted sleeve, a feed-arm projecting therefrom provided with a feed-nut which engages with the feed-shaft, a repro-
25 ducer-arm projecting from the traveler, reproducing mechanism carried thereby, an arm carried by the traveler, an oscillator secured to the free end thereof, a cam-collar attached to the feed-shaft, which cam-collar
30 is engaged by the oscillator to raise the reproducer upon the completion of its outward stroke, a lever having a portion arranged to engage with the return worm-shaft upon the raising of the reproducer in order to restore
35 the same to its starting-point, and devices which support the reproducer in its raised position and automatically lower same upon reaching its starting-point to disengage the lever from its return worm-shaft and place
40 feed-nut into engagement with its feed-shaft.

5. In a phonograph, the combination with the feed-shaft, of means actuated thereby to move the phonograph-reproducer outwardly
45 over the record, of mechanism for restoring the reproducer to its starting-point upon the

completion of its outward stroke, a cam-collar on the feed-shaft, an oscillator arranged to swing longitudinally of the feed-shaft which gradually moves onto the collar to
50 raise the reproducer, and means carried by the reproducer mechanism which automatically engages with the return mechanism when the reproducer is raised and is auto-
55 matically released from engagement therewith when the reproducer reaches its starting-point.

6. In a phonograph, the combination with the feed-shaft, of a return worm-shaft, connection between the drive mechanism and the said return worm-shaft, (whereby the same
60 is driven in an opposite direction to the feed-shaft,) means for raising the reproducer of the phonograph upon the completion of its outward movement, and of mechanism which
65 automatically engages with the return worm-shaft to restore the reproducer to its starting-point when raised and is automatically released from engagement therewith when the
70 reproducer is lowered at its starting-point, said mechanism including a pivoted lever having a portion arranged to engage the return worm-shaft.

7. The combination with the reproducer or diaphragm head, of means for raising same
75 at the end of its outward movement, a roller connected to the reproducer-head by a hinged lever or arm, said roller serving to hold the head in its raised position until returned to
80 its starting-point, a device for preventing the roller moving from a vertical position during the return movement of the head after the head has been raised, and mechanism for returning the reproducer or diaphragm head to its starting-point.

In witness whereof I have hereunto set my
85 hand.

ELAM GILBERT.

Witnesses:

N. A. ACKER,

D. B. RICHARDS.

1000

.

No. 738,317.

PATENTED SEPT. 8, 1903.

E. GILBERT.

STARTING AND STOPPING MECHANISM FOR PHONOGRAPHS.

APPLICATION FILED DEC. 18, 1902.

NO MODEL.

FIG. 1

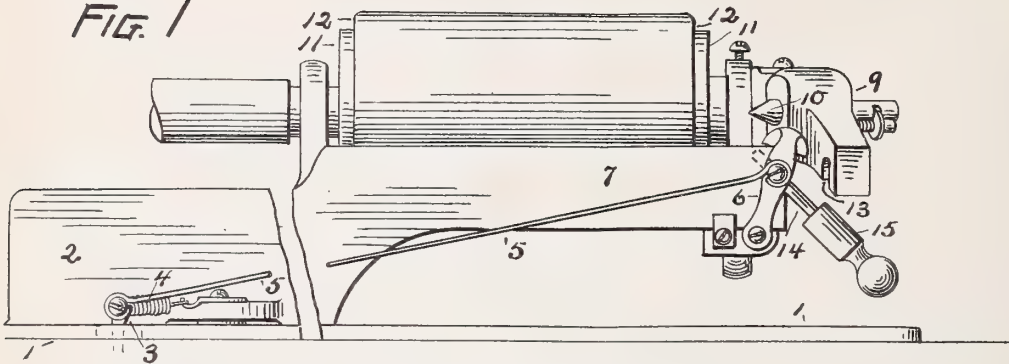


FIG. 2

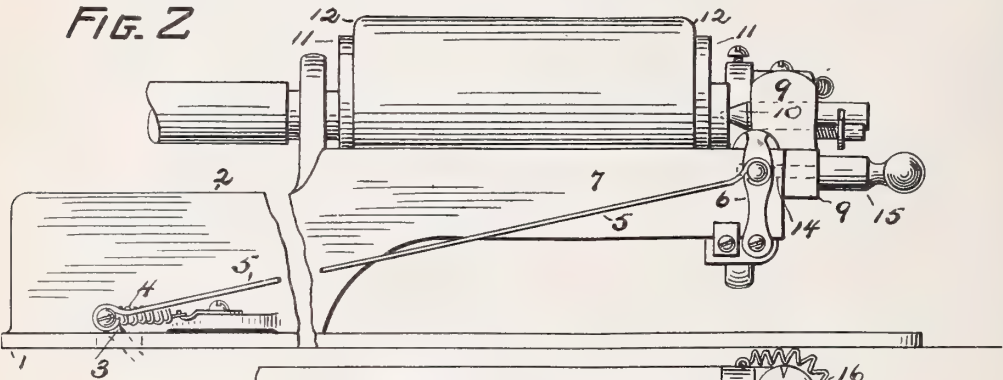


FIG. 3

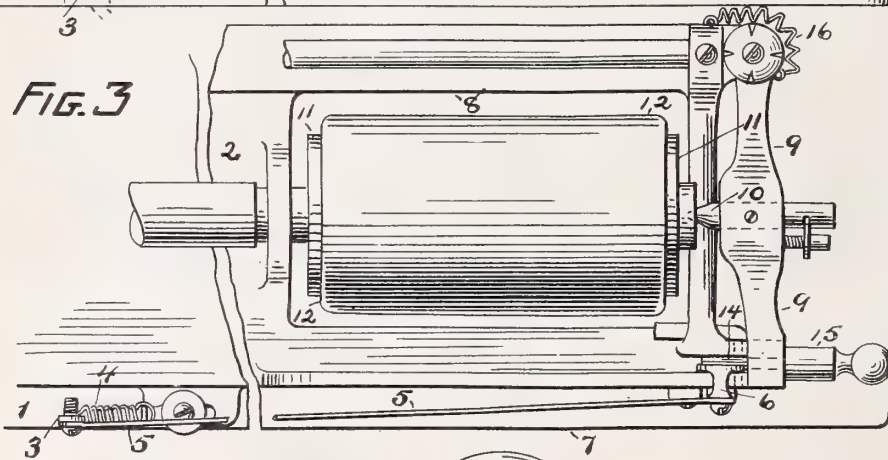
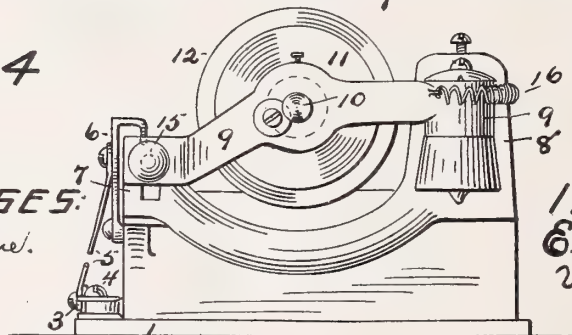


FIG. 4



WITNESSES:

Walter F. Vane.
D. B. Richards

INVENTOR.

E. Gilbert
by W. A. Oster
his atty.

UNITED STATES PATENT OFFICE.

ELAM GILBERT, OF PORTLAND, OREGON.

STARTING AND STOPPING MECHANISM FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 738,317, dated September 8, 1903.

Application filed December 18, 1902. Serial No. 135,692. (No model.)

To all whom it may concern:

Be it known that I, ELAM GILBERT, a citizen of the United States, residing at Portland, county of Multnomah, State of Oregon, have invented certain new and useful Improvements in Starting and Stopping Mechanism for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention comprises means whereby the operating mechanism of a phonograph is automatically thrown in and out of operation by the closing and opening of the gate.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a broken front view of an ordinary phonograph with the improved mechanism connected thereto, the same being illustrated with the gate released. Fig. 2 is a similar view with the gate closed. Fig. 3 is a top plan view of the mechanism illustrated by Fig. 2 of the drawings, and Fig. 4 is an end view in elevation viewed from the record-receiving end of the machine.

The numeral 1 is used to indicate the bed-plate of an ordinary phonograph, and 2 the record-cylinder frame. Through the bed-plate 1 extends the starting-lever 3, which controls the operating mechanism. (Not shown.) This lever 3 is connected to the bed 1 by the pressure-spring 4, the tension of which normally holds the lever 3 to lock the operating mechanism. To this lever is attached one end of the connecting-rod 5, the opposite end of which is attached to an arm 6, fulcrumed to the outer portion of frame-arm 7, Figs. 1 and 2 of the drawings. To the opposite frame-arm 8 is hinged the gate 9, which carries a bearing-pin 10 for the outer end of the record-cylinder 11. This pin 10 as the gate is closed fits within a center seat in the outer end of the record-cylinder 11 for the record 12 and forms an outer bearing therefor.

In the under face of the gate 9, near its outer end, is formed a transverse seat 13, which receives the lock-clutch 14 when thrown upward. This lock-clutch is hinged to the frame-arm 7, and the same is provided with an enlarged head 15, which bears upon the

gate when closed and the lock-clutch 14 is thrown upward.

Presuming the gate 9 to be open, Fig. 1 of the drawings, and it is desired to start the phonograph, the operator swings the gate inward, so as to place the bearing-pin 10 into center seat of the record-cylinder 11. As the gate is thus closed the outer end thereof bears against the fulcrumed arm 6 and forces same inward, thereby causing the connecting-rod 5 to move therewith, so as to throw the starting-lever 3 to release the operating mechanism, Fig. 2 of the drawings. To hold the gate 9 in this position, the lock-clutch 14 is thrown upward until it assumes a position approximately at right angles to the outer face of the gate, Figs. 2 and 3 of the drawings, when the head 15 of the lock-clutch will hold the gate against outward movement. To release the gate 9 for the purpose of stopping the operating mechanism of the phonograph, the operator simply throws the lock-clutch downward or out of engagement with the gate. Being thus released the pressure of the spring 4 draws the starting-lever 3 outward, Fig. 1 of the drawings, to stop the operating mechanism of the phonograph, as usual in this class of machinery, at the same time throwing the connecting-rod 5 outward with sufficient force to cause the fulcrumed arm 6 to swing the gate 9 clear. It is required that the gate be swung open or outward its full distance, so that the record 12 when removed from off record-cylinder 11 will not be mutilated by coming in contact with center bearing-pin 10, projecting from the gate 9. To insure full outward swing of the gate when thus released, a return-spring 16 is provided, which spring is attached to the gate 9 and frame-arm 8, Figs. 3 and 4 of the drawings.

The operating means for the phonograph has not been illustrated, inasmuch as the connection of the starting-lever 3 therewith is the same as at present in use. This connection is such that the said mechanism is thrown into operation and out of operation by moving the starting-lever inward and outward.

Having thus described the invention, what is claimed as new, and desired to be protected by Letters Patent, is—

1. In a phonograph, the combination with the starting-lever, of the hinged gate, and

connections for actuating the operating mechanism with the closing and opening of the gate.

5 2. In a phonograph, the combination with the hinged gate, of coacting mechanism whereby the operating mechanism of the phonograph is thrown into and out of action with the closing and opening of the gate.

10 3. In a phonograph, the combination with the starting-lever, of the gate, a fulcrumed arm actuated with the closing of the gate, connection between the said fulcrumed arm and the starting-lever, a clutch-lock for holding the gate in locked position, and a spring
15 connection whereby the starting-lever is ac-

tuated to stop the operating mechanism of the phonograph upon the releasing of the gate.

4. The combination with the swinging gate, of the lock-clutch for holding the gate in 20 locked position, and a spring connection between the swinging gate and the machine-frame whereby the swinging gate is thrown its full distance when released.

In witness whereof I have hereunto set my 25 hand.

ELAM GILBERT.

Witnesses:

N. A. ACKER,

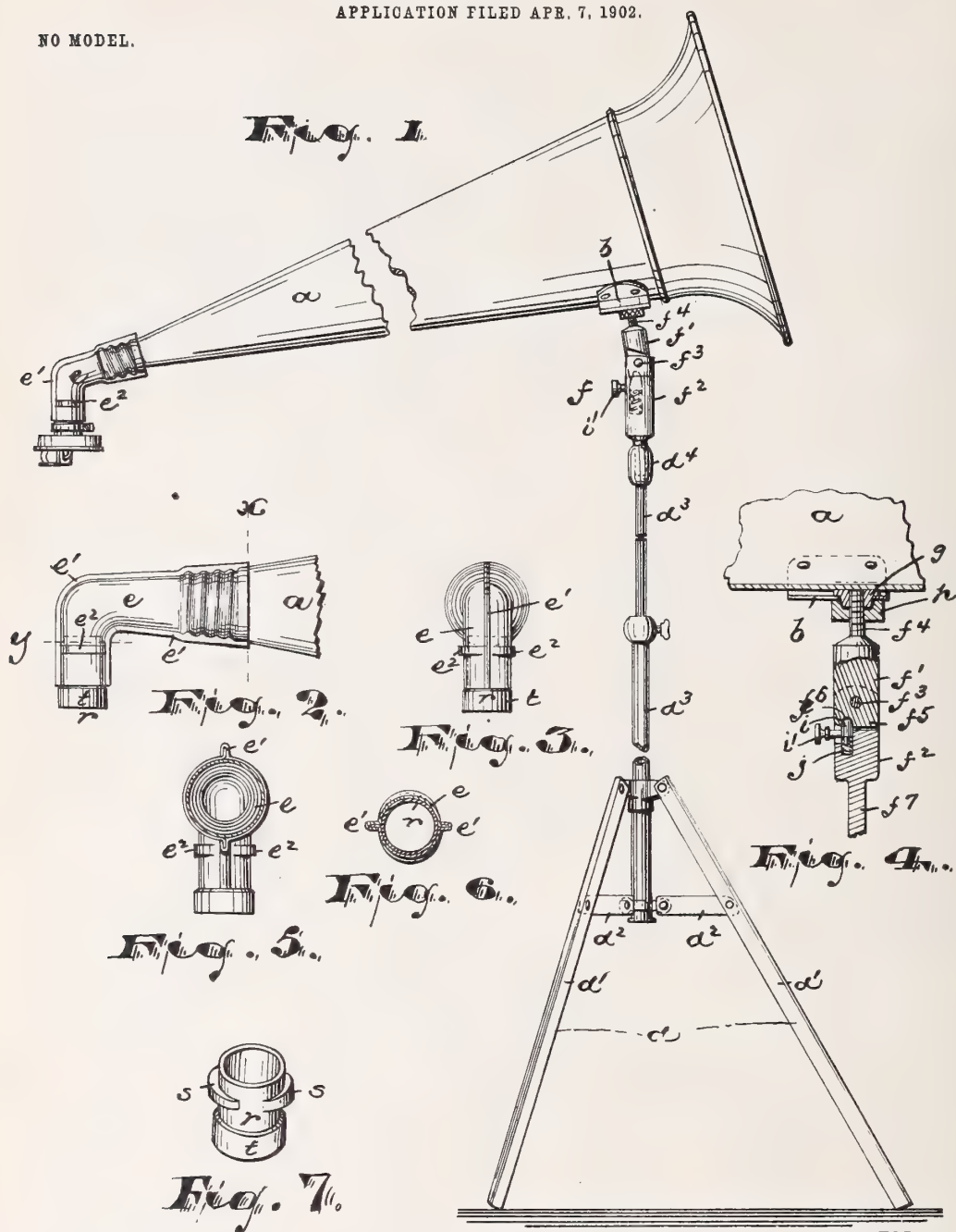
D. B. RICHARDS.

1882

A. S. MARTEN.
INTERCHANGEABLE SOUND AMPLIFYING MEANS FOR TALKING
OR SOUND REPRODUCING MACHINES.

APPLICATION FILED APR. 7, 1902.

NO MODEL.



WITNESSES:

Harry Krug

Russell M. Averell

INVENTOR

Albert S. Marten,

BY

Drake & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALBERT S. MARTEN, OF EAST ORANGE, NEW JERSEY.

INTERCHANGEABLE SOUND-AMPLIFYING MEANS FOR TALKING OR SOUND-REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 738,342, dated September 8, 1903.

Application filed April 7, 1902. Serial No. 101,648. (No model.)

To all whom it may concern:

Be it known that I, ALBERT S. MARTEN, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Interchangeable Sound-Amplifying Means for Talking or Sound-Reproducing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in that class of sound-amplifying connections for phonospheres, phonographs, graphophones, gramophones, and similar sound recording and reproducing machines illustrated in the application filed in the United States Patent Office January 24, 1902, Serial No. 91,032, the objects of the present improvements being to increase the convenience with which interchanges of the horn and talking-machines can be effected to facilitate construction and secure a more efficient operation of the parts and to obtain other advantages and results, some of which may be more fully and specifically referred to hereinafter in connection with the description of the working parts.

The invention consists in the improved interchangeable sound-amplifying means for talking or sound-reproducing machines and in the arrangements and combinations of parts of the same, all substantially as will be hereinafter set forth, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is an elevation showing a horn supported upon a stand, said horn being separably attached to the diaphragm-box or speaker of a sound-reproducing machine. Fig. 2 is a detail showing the small end of the horn, on which is a tubular metallic connection having a rubber or other elastic connection inserted therein. Fig. 3 is an end view of the same. Fig. 4 shows in detail an upper extension of the stand; and Figs. 5

and 6 are sectional views taken at lines *x* and *y*, respectively. Fig. 7 is a detail view of a certain elastic washer.

In said drawings, *a* indicates the horn, which is of the construction described in my said prior application, being provided at its small end with a screw-thread and near its large end with a socket *b*, adapted to receive the vertical center post of the stand *d*. Separably attached to the said small end of the horn is a short rigid metallic tube *e*, threaded in correspondence with the threads on the horn, and thus adapted to be screwed firmly and tightly to the horn, so that there will be no looseness at the joint conducive to vibration and an interference with proper sound reproductions. Said metallic tube *e* is also separable and independent from the diaphragm-box or speaker.

The stand *d* is preferably of the folding type, having legs *d'*, braces *d''*, and the center-post *d'''*, the latter being in telescopic sections. The center-post is provided at the top with a socket *d'* for a separable extension *f*, the latter comprising pieces *f'* *f''*, hinged together, the hinge-pin being shown at *f'''* in Figs. 1 and 4. At the top of the upper section *f'* the same is threaded, as at *f''*, and provided with clamp-plates *g* *h*, one to enter the socket and the other to clamp the parts in rigid immovable relation, the second being preferably a finger-nut, threaded to properly engage the threads *f''*. At the lower end of the extension section or part *f'* the same is provided with a stop-bearing *f'''* to engage the lower section or part *f''* and limit the pivotal movement of the upper member *f'*, so that it will stop when it arrives at a position of vertical alinement with the lower section *f''* and the post *d'''*. The said lower end of the section or part *f'* is also provided at *f'''* with a socket to receive the projecting end of a latch-bolt *i*, arranged in a spring-chamber formed in the section or part *f''*. Below said latch-bolt a spring *j* is arranged in said chamber to throw the latch-bolt into its locked position. The latch-bolt has a lateral finger-piece *i'*, by which it can be pressed down against the spring *j* to release the section or part *f'* to permit the turning of the member or part *f'* to a horizontal position and the horn to a vertical position, as hereinafter described. At the lower end of the part or

section f^2 the same is reduced in diameter to form a leg f^7 to enter the socket d^4 , where it may be removably secured or allowed to rest free to be withdrawn at will.

5 By uncoupling the small end of the horn and pressing down upon the finger-piece i the horn will assume a vertical position because of the arrangement of the socket described, the small end of the horn overbalancing the
10 large end and the latter lying uppermost. The vertical arrangement of the horn on the stand permits the horn to be set aside in a corner, where it will not occupy much floor-space and without detaching said horn from its stand,
15 the bell thus lying free from the floor away from danger of injury.

The construction described, taken in connection with separable coupling-tubes suited to the machine with which the horn is to be used,
20 enables a rigid connection to be made with the machine and yet permits of a quick detachment without removing the horn from the stand. The tubular connection preferred for the disk-machines and the phonosphere is
25 angularly formed and pressed in half-sections from sheet metal, each section having a flange e' extending around the angle from one end of the tube to the other, one of the flanges being wider than the other, and thus adapted
30 to be doubled over the other to hold the sections together, as shown in Fig. 5. At one end of each section of the tube e the metal is impressed with screw-threads which correspond, so that when the sections are joined the
35 threads will be continuous spirals suited to receive the threads of the horn. At the opposite end of the tube the sections are indented or impressed to form hollow outwardly-projecting bosses e^2 . The cavities formed on the inside
40 of the bent tube are adapted to receive stay ribs or lugs s , cast or formed on the periphery of an elastic washer r . Said washer fits closely within the end of the tube e and is held therein by the ribs or lugs s , which are
45 adapted to spring into place in the cavities when the washer is forced into the tube. The elastic washer at one end is formed with an outward annular rib t on its periphery, which forms a shoulder against which the end of
50 the metallic tube abuts. By this construction the tube e can be fitted closely upon the tubular extension of the speaker or diaphragm-box without danger of looseness due to variations in diameter of said tubular extensions or the
55 interference with proper sound reproductions because of such looseness.

To change the horn from a phonograph to a phonosphere, for example, it becomes only necessary to withdraw the tubular extension
60 suited to the phonograph from the speaker or diaphragm-box of said phonograph, unscrew the said tubular connection, the horn being

held at the desired horizontal position to facilitate the work, then apply the angular and threaded connection e by screwing it upon
65 the horn, and finally pushing the cushion-like or elastic washer thereof upon the speaker of the phonosphere, thus enabling the one horn to serve with either of the various talking-machines. 70

Having thus described the invention, what I claim as new is—

1. The combination with the horn and speaker or diaphragm-box, of a tubular metallic connection separable from the horn and
75 having at its end distant from the horn an elastic washer having a detent holding said washer within said connection when withdrawing the same from the diaphragm-box, and adapted to engage the said diaphragm-
80 box, substantially as set forth.

2. The combination with the horn having a threaded small end, of a tubular connection screwed at one end on said horn and thereby
85 removably fixed against movement in the direction of the longitudinal axis of the said horn and at the opposite end having an elastic rubber washer fitted therein and adapted to receive the speaker or diaphragm-box, substantially as set forth. 90

3. The combination with the horn having a threaded small end, of a tubular connection screwed on said small end, and having at its end opposite that receiving the horn, an elastic washer, the connection being interiorly in-
95 dented to form a hollow recess and the washer being provided with lugs to enter said hollow recess, substantially as set forth.

4. The combination with the horn, speaker, diaphragm-box and stand, of a rigid, angular,
100 metallic tube, interposed between said horn and box and separable from both said horn and said box, said tube being in sections, flanged and joined together at their edges, substantially as set forth. 105

5. The combination with the horn, diaphragm-box and stand, of a coupling-tube adapted to be secured to the horn and provided with means to resist longitudinal movement, or movement both inward and out-
110 ward in the direction of the longitudinal axis of the horn from the said horn, and having an india-rubber washer secured in the end thereof opposite that having said means for resisting said longitudinal movement and adapted
115 to closely fit speakers or diaphragm-boxes of varying diameters, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 29th day of March, 1902.

ALBERT S. MARTEN.

Witnesses:

CHARLES H. PELL,
C. B. PITNEY.

738.764

Booth

No. 738,764.

PATENTED SEPT. 15, 1903.

H. E. BOOTH.
TALKING MACHINE.
APPLICATION FILED MAY 19, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses:
J. B. Weir
Chas. D. Perry

Inventor:
Hiram E. Booth
by Arthur F. Durand
Atty.

No. 738,764.

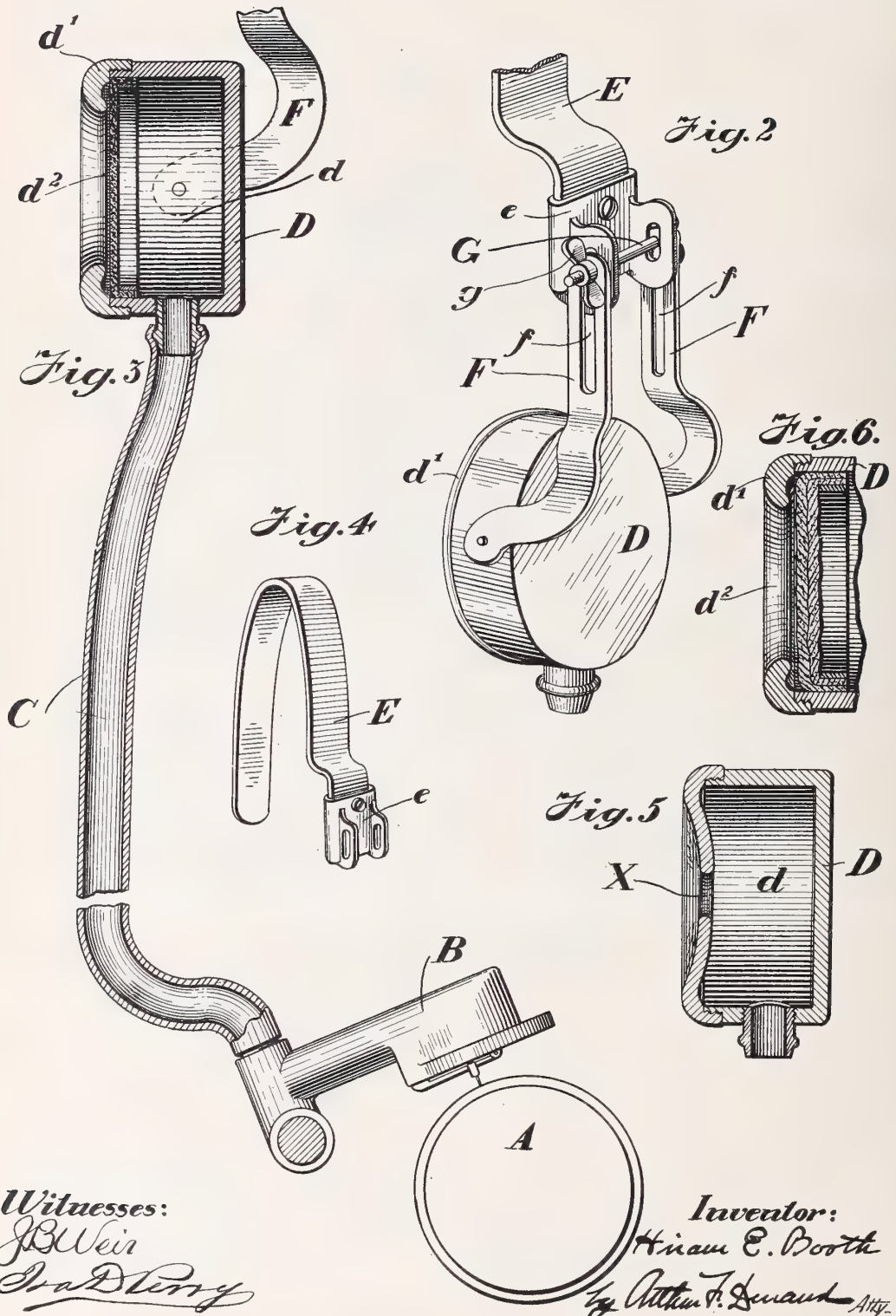
PATENTED SEPT. 15, 1903.

H. E. BOOTH.
TALKING MACHINE.

APPLICATION FILED MAY 19, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
J. B. Weir
W. A. Derry

Inventor:
Hiram E. Booth
by Arthur F. Leland Atty.

UNITED STATES PATENT OFFICE.

HIRAM E. BOOTH, OF SALT LAKE CITY, UTAH.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 738,764, dated September 15, 1903.

Application filed May 19, 1902. Serial No. 107,997. (No model.)

To all whom it may concern:

Be it known that I, HIRAM E. BOOTH, a citizen of the United States of America, and a resident of Salt Lake City, Utah, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

It is a matter of common knowledge that for some time past stenographers in various offices have been receiving dictation from phonographs, gramophones, and other talking-machines. It is also a fact, more or less generally known, that this practice is rapidly falling into disfavor for the reason that it has a tendency to make the ears sore and in some cases to injure the ear-drums and, perhaps, produce deafness for life. This appears to be due to different causes, among which are the violent impacts of the sound-vibrations upon the ear-drums and the weight of the tubes upon the ears. It is obvious, however, that there are various other things which may combine to produce the irritation and soreness which a large percentage of the stenographers experience in using the forked-tube arrangement provided by the companies handling the various talking-machines. But whatever the explanation may be as to the cause of this trouble it is a fact, as stated, that sooner or later it compels the stenographer to give up this method of receiving dictation. Now after considerable experimenting I have discovered that this trouble may be effectually remedied in various ways. For example, I find that the tendency to produce soreness of the ears may be considerably lessened by employing a head-piece which will hold the receiver away from the ear or which will at most cause the receiver to be pressed but slightly against the ear. Again, I find that the character of the sound-vibrations may be modified by employing a receiver having a resonance-chamber, and that by so doing the tendency of the sound-vibrations to produce irritation of the ear-drum is greatly reduced. I also find that this tendency may be still further reduced by employing a receiver having a fibrous material—such as cloth, wadding, or other similar fabric—covering its opening. I also find that varying results may

be obtained by employing rubber, leather, and other like materials, and it is even possible that metallic diaphragms may be successfully employed for this purpose, as will hereinafter more fully appear. At any rate, with a provision of this character and, as stated, with a head-piece adapted to hold the receiver away from the ear or pressed only slightly against the ear I find that it is possible for a stenographer to receive dictation in this manner without experiencing any unpleasant results.

Generally stated, it is therefore the object of my invention to provide a simple and comparatively inexpensive construction and arrangement whereby dictation may be taken from a talking-machine without injury to the ear or ear-drum.

It is also an object to provide certain details and features of improvement tending to increase the general serviceability and efficiency of a device of this character, and to these and other useful ends my invention consists in matters hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 illustrates a stenographer seated at a typewriter and engaged in taking dictation from a talking-machine involving the principles of my invention. Fig. 2 is a perspective of the receiver and adjustable connection between the same and the head-piece. Fig. 3 is a sectional view, more or less diagrammatic in character, of one construction of the receiver, and also illustrating the method of connecting the same with the transmitter or reproducer of a talking-machine. Fig. 4 is a perspective of the arch-shaped portion of the head-piece, which is employed for supporting the receiver at the side of the ear. Fig. 5 shows another form of receiver. Fig. 6 shows a receiver with a thicker diaphragm or obstruction.

My invention thus embodied in practical form may comprise the usual rotary record A and also the usual transmitter or reproducer B. It will be understood that these elements can be of any suitable known or approved form. Preferably the said transmitter or reproducer is adapted to be connect-

ed with a flexible tube C, which is preferably of a length to extend from the talking-machine to the head of the listener. At the other end of this tube I provide a suitable receiver B.

- 5 As shown in Fig. 3, this receiver is box-like in form and has a resonance-chamber d . A cap d' can be suitably secured to the face of the receiver, and the opening of the cap can be covered or obstructed by a diaphragm d^2 .
- 10 This diaphragm can be of any suitable character. For example, it may consist of superimposed layers of cloth, such as glazed cotton, wadding, or any other fibrous fabric. As previously stated, it may also be of rubber
- 15 or other like material, and in some cases a single metal diaphragm may be employed with good results. With superimposed layers of fabric or other like fibrous material the thickness of the diaphragm can be varied according to the character of the sound-waves to be acted upon, and in any event and regardless of the material to be employed—that is to say, whether the obstruction in the receiver be of metal, wood, cloth, leather, or
- 20 other materials—I find that very good and, as far as I know, the best, results are obtained when the formation and construction are such as to give the diaphragm a more or less non-vibratory and porous character, so that whatever the material it will be advisable to employ it in such quantity as to provide a diaphragm of sufficient thickness and porosity as to insure a practically non-vibratory diaphragm, and any material mentioned may be
- 25 employed separately or, as is obvious, these materials may be employed together in alternate layers according to requirements and as may be found desirable.

- In Fig. 5 the receiver has no diaphragm or
- 30 other obstruction; but the face of the receiver is provided with an opening X, which is relatively small as compared with the opening in the cap d' . The box portion or body of the receiver can be made of any suitable material. I find that good results are obtained by employing wood, rubber, paper, or some other non-metallic substance. Now as to the head-piece for supporting the receiver in position at the side of the ear it is preferable that this part of the structure be of such character that the receiver will stand clear of the ear, or at most only press slightly against the ear. In Fig. 1 it will be seen that the head-piece is adjusted in such manner that the receiver does not touch the ear. I find, however, that no unpleasant results are experienced by pressing the receiver gently against the ear. In order that the receiver may balance well, and in order to avoid the direct
- 35 impact of the sound-waves upon the eardrum, I find that it is preferable to connect the bottom or lower side of the receiver with the tube C. In other words, the lateral admission of sound-vibrations to the receiver
- 40 appears to give better results than can be ob-

tained by attaching the tube to the back of the transmitter. The said head-piece can be of any suitable form or construction. For example, it may comprise an arched spring-like portion having one end bent slightly outward and provided with a slotted casting E. With this arrangement the receiver can be pivoted at its sides upon the hangers F, and the latter can be provided with slots adapted to receive the bolt G. This bolt, it will be observed, extends through the slots or openings in the casing E and is preferably provided with a butterfly-nut g . With this arrangement the hangers F can be adjusted up and down, so as to bring the receiver into proper position, and the butterfly-nut g can then be screwed down to clamp the hangers tightly in place. Thus adjustably mounted upon the head-piece the receiver can be adjusted so as to assume the desired position at the side of the head. It can be swung toward or away from the ear, as the character of the work may require and in accordance with any preference on the part of the listener.

With the foregoing arrangement the sound-vibrations are transmitted by the reproducer B and are carried through the tube to the chamber in the receiver. At this point the sound-vibrations are relieved of their harshness and are modified or changed in a way to make them extremely agreeable to the listener. The scraping sounds do not appear to be in evidence and no vibrations are transmitted directly through the different materials to the drum of the ear. No weight is thrown upon the ears, and consequently no soreness results from the continual use of the talking-machine. With the ordinary arrangement the sound-vibrations are conducted through a tube and allowed to escape through the tips which are inserted in the ears. These tips have small openings, which seem to force the sound with more or less shock or irritation directly against the ear-drums. With my construction and arrangement, however, this trouble is obviated, and the sound-waves are conducted to the listener's ear without harshness or violence and in a way to produce no irritation or injury of the ear-drum.

I claim as my invention—

1. A talking-machine, comprising suitable means for propagating the sound-waves, a minutely-porous and non-vibratory diaphragm arranged to be held close to the ear, and a resonance-chamber located immediately back of said diaphragm and adapted to receive the sound-waves from said propagating means.

2. A talking-machine, comprising suitable reproducing mechanism for propagating the sound-waves, a receiving instrument provided with a porous and non-vibratory diaphragm adapted to be held close to the ear, said receiving instrument having also a reso-

nance-chamber located back of said diaphragm, and suitable tubing for connecting said resonance-chamber with said reproducing mechanism.

5 3. The combination of a rotary record, a transmitter associated with said record, a box-like receiving instrument having a resonance-chamber and a non-vibratory diaphragm adapted to be held to the ear, and a flexible
10 tube connecting said resonance-chamber with said transmitter.

4. A talking-machine, comprising a rotary record, a transmitter associated with said record, a receiving instrument provided with a
15 resonance-chamber and a diaphragm adapted to be held to the ear, a flexible tube connecting said resonance-chamber with said transmitter, and a head-piece adapted to hold the said receiving instrument away from the ear.

20 5. A talking-machine, comprising a suitable record, a transmitter associated with said record, a head-piece, a receiving instrument adjustably mounted upon said head-piece and thereby adapted to either stand
25 clear of the ear or to press slightly against the ear, said receiving instrument being constructed with a resonance-chamber having its outlet closed by a porous and non-vibratory diaphragm, and a flexible tube connecting
30 said transmitter with said resonance-chamber.

6. A talking-machine, comprising a suitable transmitting instrument for propagating the sound-waves, a receiving instrument
35 adapted to be held to the ear, said receiving instrument being constructed with a resonance-chamber having its outlet covered by a porous and non-vibratory sound-modifying diaphragm, such as cloth or the like, and
40 suitable connection between said resonance-chamber and said reproducing mechanism.

7. A talking-machine, comprising suitable reproducing mechanism, a receiving instrument provided with a resonance-chamber and
45 a fibrous non-resonating diaphragm adapted to be held close to the ear, said diaphragm having a multitude of minute openings, a flexible tube leading from said reproducing mechanism and having a lateral point of connection with said resonance-chamber, and a
50 head-piece adapted to support said receiving instrument and prevent the latter from pressing against the ear.

8. A talking-machine comprising a rotary
55 record, a transmitter or reproducer associated with said record, a receiving instrument adapted to be held to the ear and provided with a resonance-chamber, a tube connecting the said chamber with said transmitter or
60 reproducer, and a diaphragm closing the outlet from said resonance-chamber.

9. A talking-machine, comprising a suitable device for propagating sound-waves, a
65 resonance-chamber adapted to be held to the ear, a tube connecting said chamber with

said device, and a porous sound-modifying diaphragm covering the outlet of said resonance-chamber.

10. A talking-machine, comprising suitable means for propagating the sound-waves, a
70 resonance-chamber connected with said means and adapted to be held to the ear, and a non-apertured and non-resonant but finely-porous diaphragm closing the outlet of said chamber.

11. A talking-machine, comprising means
75 for propagating sound-waves, a non-resonant sound-modifying diaphragm adapted to be held close to the ear, and a tube through which the sound-waves pass from said means to said diaphragm.

12. In a talking-machine, the combination of suitable reproducing mechanism, a receiving
80 instrument provided with a non-resonant diaphragm and a resonance-chamber adapted to be held close to the ear, and a flexible tube
85 leading from said reproducing mechanism and having a lateral point of connection with said resonance-chamber.

13. A talking-machine, comprising suitable reproducing mechanism, a receiving instrument
90 provided with a resonance-chamber adapted to be held close to the ear, a head-piece adapted to hold said instrument away from the ear, and a tube leading from said reproducing mechanism and having a bottom
95 point of connection with said chamber.

14. The combination of means for propagating sound-waves, a receiving instrument connected with said means, a head-piece upon
100 which said instrument is mounted, and means including a screw whereby said instrument may be adjusted toward and away from the ear.

15. The combination of a record, a transmitter, a receiver, a flexible tube connecting
105 the transmitter with the receiver, a head-piece for supporting the receiver, and means whereby said receiver can be adjusted upon said head-piece and moved toward and away from the ear.

16. A talking-machine, comprising a suitable transmitting instrument for propagating
110 sound-waves, a structure providing an outlet through which said sound-waves pass, and a fibrous and porous member arranged to be held close to the ear, said member closing the
115 outlet of said passage and thereby intercepting and changing the character of said sound-waves before the latter reach the ear.

17. A talking-machine, comprising a suitable
120 record, a transmitting instrument associated with the said record, a box-like receiving instrument adapted to be held to the ear, a porous and non-resonant member closing the outlet of said instrument, and a flexible
125 tube leading from said reproducing mechanism and having a lateral point of connection with said receiving instrument.

18. In a talking-machine, the combination of a suitable record, a transmitting instru-
130

ment associated with said record, a receiving instrument connected by a suitable passage with said transmitting instrument, and a fibrous and porous obstruction adapted to
5 completely close the outlet of said receiving instrument, said obstruction being thereby adapted to intercept and alter the character of the sound-waves propagated by said trans-

mitting instrument before such waves are allowed to reach the ear of the listener.

Signed by me at Chicago, Cook county, Illinois, this 8th day of May, 1902.

HIRAM E. BOOTH.

Witnesses:

MARSHALL D. WILBER,

HARRY P. BAUMGARTNER.

739,303

No. 739,303.

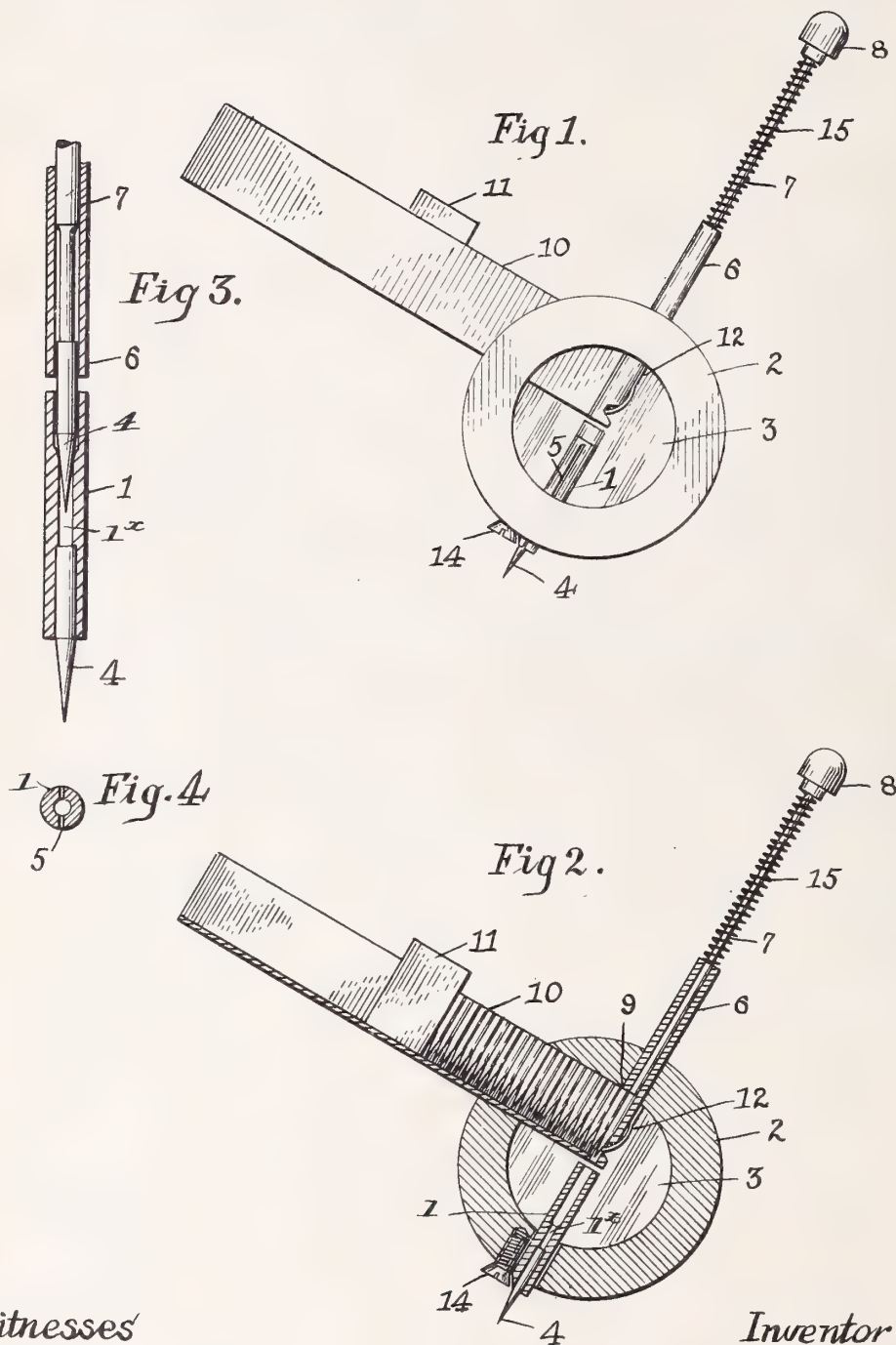
PATENTED SEPT. 22, 1903.

E. D. GLEASON.

NEEDLE FEEDING DEVICE FOR TALKING MACHINES.

APPLICATION FILED JAN. 20, 1902.

NO MODEL.



Witnesses

Edw. W. Vaill Jr.
Jno. F. Cross.

Inventor

Edward D Gleason
by Horace Pettit
his Attorney

UNITED STATES PATENT OFFICE.

EDWARD D. GLEASON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

NEEDLE-FEEDING DEVICE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 739,303, dated September 22, 1903.

Application filed January 20, 1902. Serial No. 90,434. (No model.)

To all whom it may concern:

Be it known that I, EDWARD D. GLEASON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Needle-Feeding Devices for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention has relation to certain improvements in talking-machines, and particularly to a device for automatically feeding the needles or stylus-points of a sound-box to their proper position in the stylus-holder.

It is well known to those familiar with talking-machines that the needles or stylus-point wears very quickly, thus necessitating the frequent changing of the point, and this has generally been effected by hand.

The object of my invention is to provide an automatic stylus-feeding mechanism having means for ejecting the old point and simultaneously feeding a new point into operative position.

With this in view my invention consists in the construction, combination, and arrangement of the various parts, the novelty of which will be hereinafter fully set forth, and particularly pointed out in the claims made hereto.

In the accompanying drawings, which form a part of this specification, and in which similar numerals are used to indicate similar parts, Figure 1 is a side elevation of that part of a talking-machine known as the "sound-box" having my improvement attached thereto. Fig. 2 is a sectional elevation of the same. Fig. 3 is an enlarged detail section through the stylus-bar and a portion of the plunger-guide. Fig. 4 is a cross-sectional view through the stylus-holder.

In carrying out my invention I provide a stylus-holder 1, which is yieldingly mounted to the sound-box casing 2 at a point intermediate of its length and is also connected at its upper end to the diaphragm 3 of said sound-box in the usual manner. The said stylus-bar is provided with a central bore of a diameter at its upper and lower ends sufficiently large to admit the stylus 4. The in-

termediate section 1^x of this bore is of a slightly smaller diameter than the upper and lower section, as illustrated in Fig. 3 of the drawings. The said stylus-bar 1 is provided with the slits 5, diametrically opposite each other, the purpose of which will be hereinafter described.

Directly above the stylus-bar 1 and in a plane therewith is a tubular guide 6, adapted to receive a plunger 7, which extends a distance beyond the upper end of said guide and is provided with a knob or button 8, as shown. The lower end of the guide 6 is provided with a lateral slot 9, into which is fitted a needle-magazine 10, which extends upwardly at an angle to the guide-slot, so that the needles will feed by gravity into the slot 9. A suitable follower, as 11, may be provided in the upper end of the magazine for facilitating the feed of the needle. The guide 6 has provided on its lower end opposite the slot 9 a spring-finger 12, which extends through an opening formed in said guide into the bore of the same and holds the needles at this point until they are released by the action of the plunger 7.

The magazine 10 is secured to the plunger-tube 6 by means of soldering or otherwise, and the two are supported on the sound-box casing 2 in any suitable manner. A set-screw 14 is threaded into the sound-box casing at a point adjacent to the lower end of the stylus-bar 1, the said screw having a projecting head which extends under the end of the stylus-bar in very close relation thereto without touching the same, so that the vibrations of this stylus-bar will not be impeded or interrupted by the said screw. The object of this screw 14 is to prevent the longitudinal movement of the stylus-bar during the operation of the plunger, so as to relieve the supporting-spring of the bar from any strain and also prevent the injuring of the connection between the upper end of the stylus-bar and the diaphragm.

In operation the magazine 10 is filled with needles having their points extending downwardly, as shown in Fig. 2, and the said needles feed by gravity into the slot 9 one by one. Upon depressing the plunger 7 the needle, which has been fed into the guide, is forced

into the stylus-bar 1, and as it passes through the narrow central bore 1^x of the stylus-bar the said bar, which is provided with the slits 5, is forced open, which allows the lower stylus-point 4 to drop out and the new point to assume its proper position. Just as soon as the new point is forced through the reduced intermediate bore of the stylus-bar the said bar will spring together and firmly hold the new point in its proper position for operation. A coiled spring 15 is interposed on the rod 7 between the upper end of the guide 6 and the knob or button on the end of the plunger for returning the same to normal position after it has been depressed.

I do not wish to confine myself to the exact details as illustrated in the drawings, as various slight changes might be made without departing from the spirit and scope of my invention.

What I claim is—

1. The combination with the sound-box, of a stylus-bar having a central bore adapted to receive and hold a needle in its lower end, a split formed in said stylus-bar, a reduced portion formed in the intermediate portion of the stylus-bar bore forming a spreader for said bar and an abutment for the needle, a needle-magazine carried by the sound-box, and mechanism for feeding the needles singly into the bore of the stylus-bar, substantially as described.

2. The combination with a sound-box, a stylus-bar carried thereby comprising a split tube, having a bore adapted to receive a needle, a reduced central portion in said bore forming a spreader for said tube and an abutment for the needle, a guide-tube located above the stylus-bar in alinement therewith, a magazine supported by the sound-box casing and connecting with the tubular guide,

means for feeding the needles singly in said guide, and a plunger-rod in said guide-tube adapted when operated to force a needle into the stylus-bar, spreading said bar, and allowing the old needle to drop out and simultaneously replace a new one, substantially as described.

3. The combination with a sound-box, a stylus-bar carried thereby comprising a split tube having a bore adapted to receive a needle, a reduced central portion in said bore forming a spreader for said tube and an abutment for the needle, a guide-tube located above the stylus-bar in alinement therewith, a magazine supported by the sound-box casing and connecting with the tubular guide, means for feeding the needles singly in said guide, a plunger-rod in said guide-tube for forcing the needle into the stylus-bar, and a stop located adjacent the end of the said stylus-bar for relieving it of strain, during the operation of the plunger.

4. The combination in a sound-box, of a stylus-bar comprising a split tube having a bore sufficient to admit a needle, a reduced intermediate portion in said bore for spreading the tube when the needle is forced there-through and to form an abutment for said needle, a guide-tube located above the stylus-bar in alinement therewith, an inclined magazine adapted to hold needles having its lower end entering the guide-tube, a spring-finger for holding a needle in said tube, and a spring-plunger adapted to the guide-tube, for the purpose described.

In witness whereof I have hereunto set my hand this 26th day of October, A. D. 1901.

EDWARD D. GLEASON.

Witnesses:

JNO. T. CROSS,
A. E. NITZSCHE.

734 318

No. 739,318.

PATENTED SEPT. 22, 1903.

E. R. JOHNSON.
SOUND RECORD.

APPLICATION FILED AUG. 8, 1900.

NO MODEL.

Fig. 1.

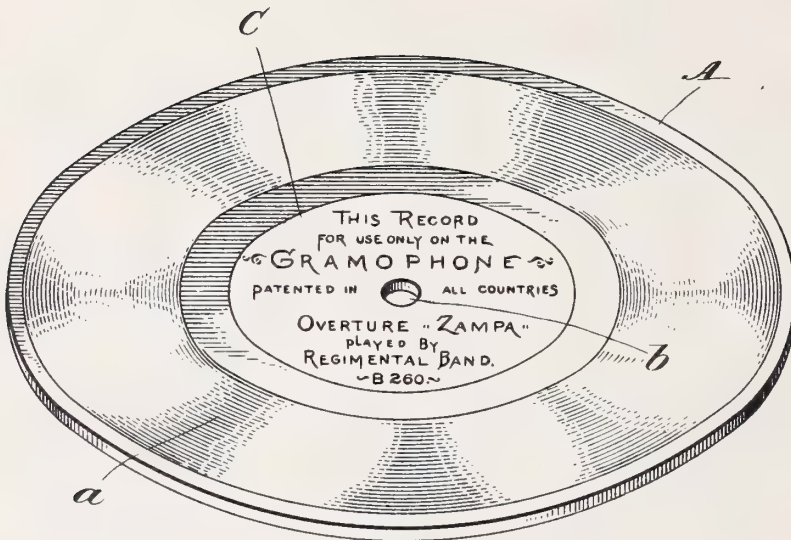
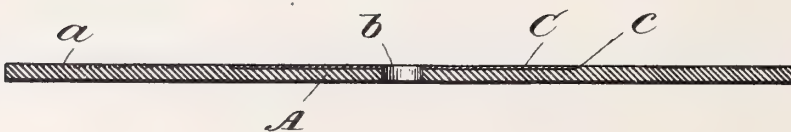


Fig. 2.



Witnesses.

Geo. T. Cross
Chas. T. Bennett

Inventor,

Eldridge R. Johnson,
by / H. M. Ellis.
his Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

SOUND-RECORD.

SPECIFICATION forming part of Letters Patent No. 739,318, dated September 22, 1903.

Application filed August 8, 1900. Serial No. 26,280. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Records, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in sound-records, and particularly to the flat disk-record, such as are used on gramophones and other similar machines.

The object of my invention is to provide a simple, inexpensive, and convenient means for marking records of this class in order that the title of the matter recorded on said record and the other matter usually engraved thereon may be easily discerned.

Heretofore it has been the practice to mark records of this class by engraving the necessary descriptive matter on the die from which the record is stamped or by etching the same upon the original record. This practice has been found to be quite expensive, inconvenient, and otherwise objectionable, and the records when so stamped are hardly legible on account of the color of the same, which is usually black or of a dark color and has to be held in a certain position, so that the light will properly fall upon the engraved matter before the same can be readily distinguished. My present invention is designed with a view of overcoming these objectionable features; and it consists in providing an inlaid tablet printed or marked with a color much lighter than that of the record adapted to the center of the said record and having the descriptive matter printed thereon before the insertion of said tablet.

In order that my invention may be thoroughly understood, I will describe the same in detail, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of a record having my improvement applied thereto, and Fig. 2 is a central sectional elevation of the same.

In the said drawings, A designates a flat circular record-disk of the gramophone type,

having the usual spirally-arranged record-grooves *a* recorded thereon. The center of the said disk is provided with an aperture *b*, by means of which the same is centered on its support when placed in position for operation in the machine.

Adjacent to the aperture *b* and preferably concentric with the center of the disk A is a recess *c* of a very slight depth. Into this recess is inlaid a tablet C, made of paper or other suitable material, printed in a light color, so as to stand out in bold contrast to the dark body of the record, and on this tablet is printed the title and such other descriptive matter as may be desired. These tablets C may be printed in large quantities at very little expense and are preferably applied to the record during the process of stamping the same, the said tablet being compressed into the center of the record while the said record is in a heated or softened condition, and after this operation the tablet is flush with the surface of the record-disk. It is obvious that by reason of the tablet being compressed into the record the tablet or label is prevented from being defaced, and the printing or marks thereon are preserved from scratches and from being made illegible from contact with other objects.

While I have illustrated the inlaid tablet as being circular, it will of course be understood that it might be rectangular or of any other suitable contour, and the edges of the same might be scalloped or notched in order to give it a more artistic appearance.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A sound-record comprising a flat disk composed of a material which will soften under the application of heat and having sound-waves impressed upon its surface, a thin tablet of a material which is adapted to receive and retain permanently printed matter, pressed into said disk when in a heated condition so as to be flush with the surface thereof.

2. A sound-record comprising a flat disk composed of a material which will soften under the application of heat and having sound-waves impressed upon its surface, a thin tablet of fibrous material having a printed title

thereon, pressed into said disk when in a heated condition so as to be flush with the surface thereof.

- 5 3. A sound-record comprising a flat disk composed of material which will soften under the application of heat having sound-waves impressed upon its surface, a centrally-disposed label pressed into said disk when in a heated semiplastic condition and secured
10 to the record material by the adhesive properties of the record material when in the softened state, the said label being pressed flush with or below the surface of the record-tablet.
15 4. A sound-record comprising a flat disk

composed of material which will soften under the application of heat having sound-waves impressed upon its surface, a thin tablet of fibrous material pressed into said disk when in a heated semiplastic condition and secured to the record material by the adhesive properties of the record material, the said label being pressed flush with or below the surface of the record-tablet. 20

In witness whereof I have hereunto set my hand this 3d day of August, A. D. 1900. 25

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,

LEWIS H. VAN DUSEN.

739.421

No. 739,421.

PATENTED SEPT. 22, 1903.

E. R. JOHNSON.
SOUND RECORD FOR TALKING MACHINES.
APPLICATION FILED AUG. 8, 1900.

NO MODEL.

Fig. 1.

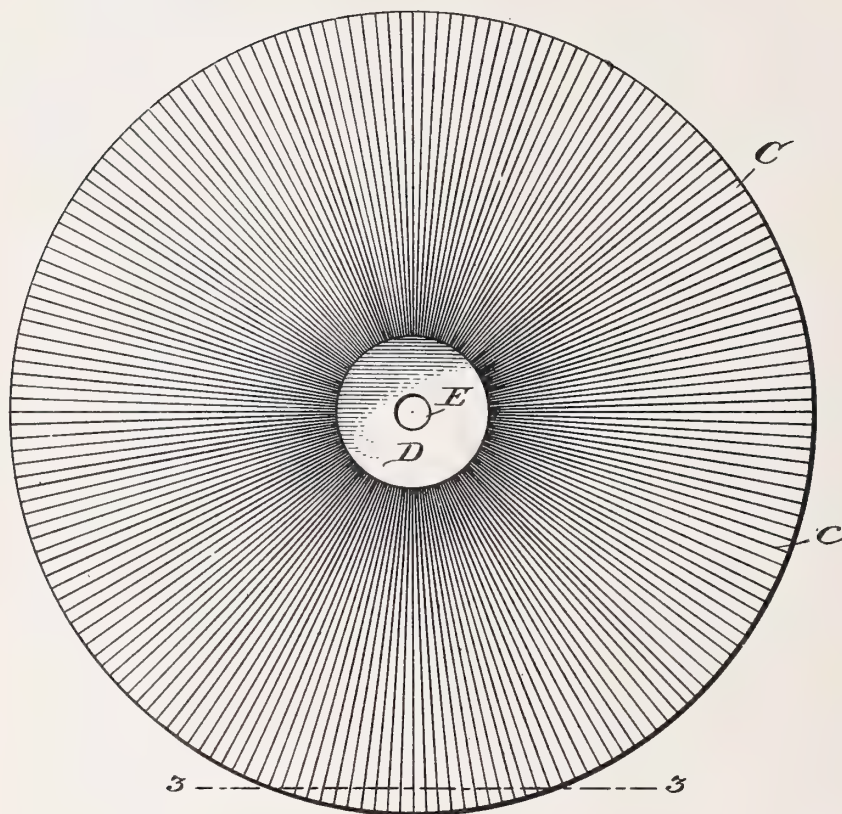


Fig. 2.

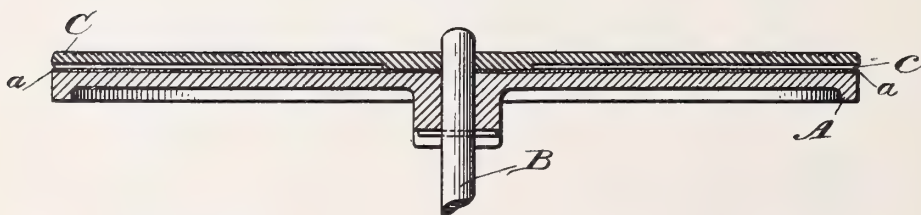


Fig. 3.



Witnesses.

Jno. S. Cross,
Chas. K. Dennett

Inventor,
Eldridge R. Johnson,
by / Horace Bellis,
his Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

SOUND-RECORD FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 739,421, dated September 22, 1903.

Application filed August 8, 1900. Serial No. 26,275. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound-Records for Talking-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming
10 part of this specification.

This invention relates to an improved sound-record, and particularly to flat records, such as are used on gramophones and other sound-reproducing machines.

15 The object of this invention is to produce a record having a serrated or ribbed under surface in order that it may bear against the turn-table or record-support of the motor with increased frictional contact and main-
20 tain its position on said record-support during the operation of the machine without the use of the usual clamping-nut, such as ordinarily used on machines of this character.

Heretofore it has been the custom to secure
25 the flat record-disk to the turn-table by providing the upper end of the turn-table spindle with a screw-threaded boss adapted to pass through an aperture formed in the center of the record and in providing a flanged nut
30 adapted to fit on the said screw-threaded boss and bear against the record, and thus hold it in position during the operation of the machine. My invention is designed for the purpose of doing away with the flanged nut and
35 constructing the record so that its own frictional contact will hold it to the record-support or turn-table and prevent it from turning except when the turn-table revolves.

In the accompanying drawings, in which
40 similar letters of reference are used to indicate similar parts, Figure 1 is a bottom plan view of the sound-record constructed in accordance with my invention. Fig. 2 is a sectional view showing the record mounted upon
45 a turn-table. Fig. 3 is a detail section on the line 3 3 of Fig. 1.

In machines of the gramophone type the record is supported upon a circular disk, as
50 A, which is mounted on a spindle B, the said spindle being suitably connected to and

driven by a spring-motor. On the upper surface of the turn-table is provided a layer of baize or felt *a*, upon which the flat circular record rests.

In carrying out my invention I form a circular record-disk C, having the sound-waves recorded thereon in the usual manner on the upper surface of said disk. The under surface of the disk is provided with a smooth circular center, as D, having a central aperture
55 E, passing therethrough, adapted when the record is in position to receive the boss *a*, which projects through the center of the turn-table A. Extending radially from the smooth circular portion B are a number of sharp-
60 pointed ridges, as *c*, extending to the circumference of the said record-disk. These ribs are located quite close together, as illustrated in the drawings, and the lower edges of the same are adapted to bear against the baize or
65 other covering provided on the upper surface of the turn-table A, and the weight of the record is sufficient to cause the said ribs to become slightly embedded in the cloth, felt, or other material, and thereby hold the said
70 record in close frictional contact with the turn-table with a sufficient degree of firmness to prevent of its being moved independently of the turn-table during the engagement of the stylus-point with the record-groove in the op-
75 eration of the machine. Owing to the radial arrangement of the ridges *c* the spaces between them and above the cloth will contain air, which will be carried around with the table and record when the same is rotated.
80 The centrifugal force produced by this rotation will tend to expel the air at the periphery of the record and so create a partial vacuum between the record and the turn-table or the cloth thereon. This partial vacuum
85 will greatly increase the frictional contact of the record with the table and so produce very firm contact between them.

I have found that a record constructed in accordance with the above description will
90 adhere to the turn-table with a sufficient degree of firmness to hold the same thereto during the operation of the machine without any other means or any clamping devices.

Having thus described my invention, what
100

I claim, and desire to secure by Letters Patent, is—

5 A sound-record for talking-machines comprising a flat disk having sound-waves recorded on one surface thereof, a central aperture provided in said disk for centering the same upon the record-support, a series of sharpened radial ribs provided on the under surface of said disk, a record-support, and a

textile covering for said support adapted to contact with the ribs on the record, substantially as described.

In witness whereof I have hereunto set my hand this 3d day of August, A. D. 1900.

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,

LEWIS H. VAN DUSEN.

739,713

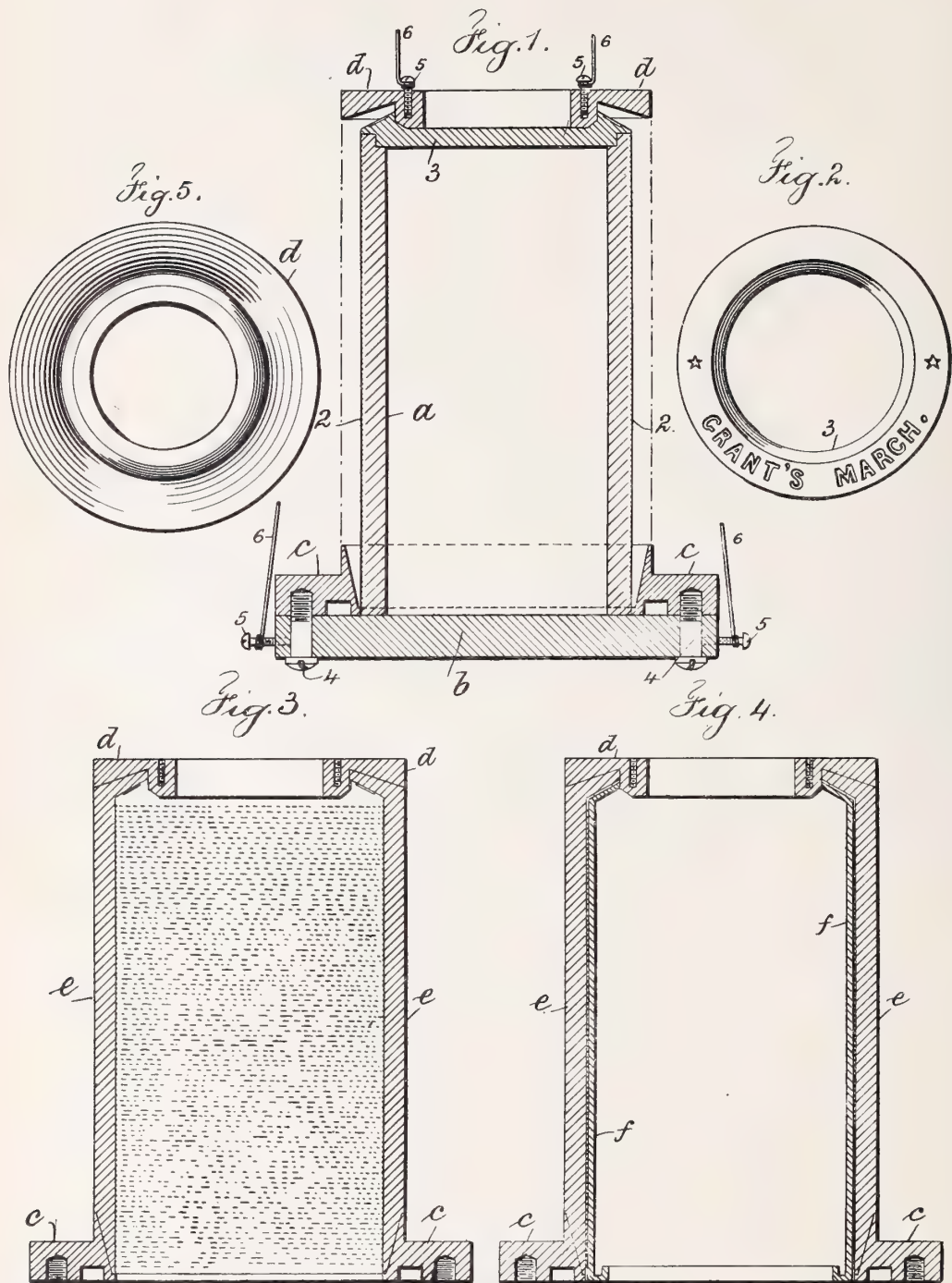
A. N. PETIT.

METAL MATRIX FOR FORMING DUPLICATE SOUND RECORD CYLINDERS.

APPLICATION FILED MAY 15, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses

Chas. H. Smith
J. Stait

Inventor

Ademor N. Petit
By L. W. Lyrell & Son
attys

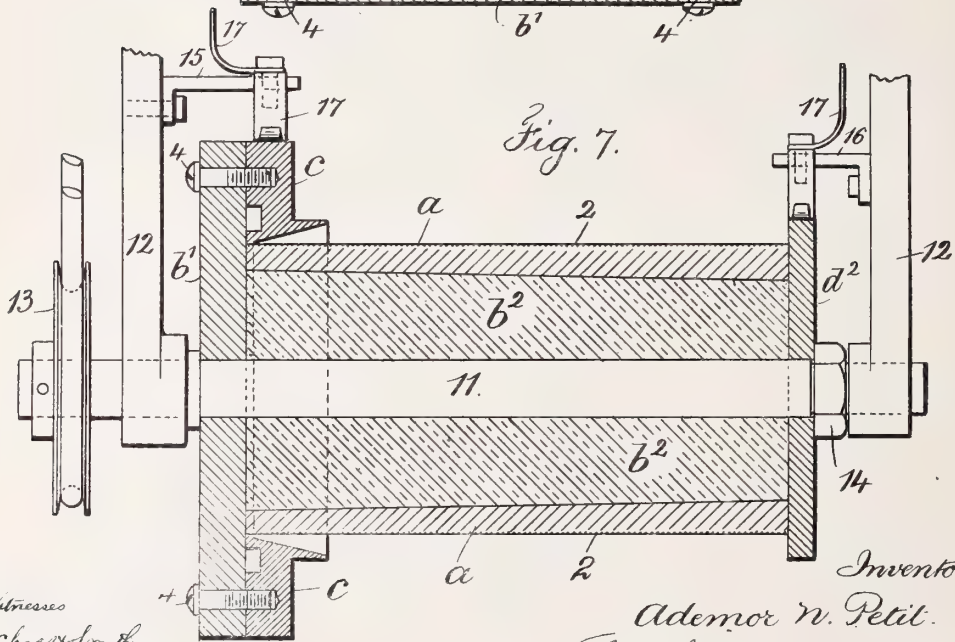
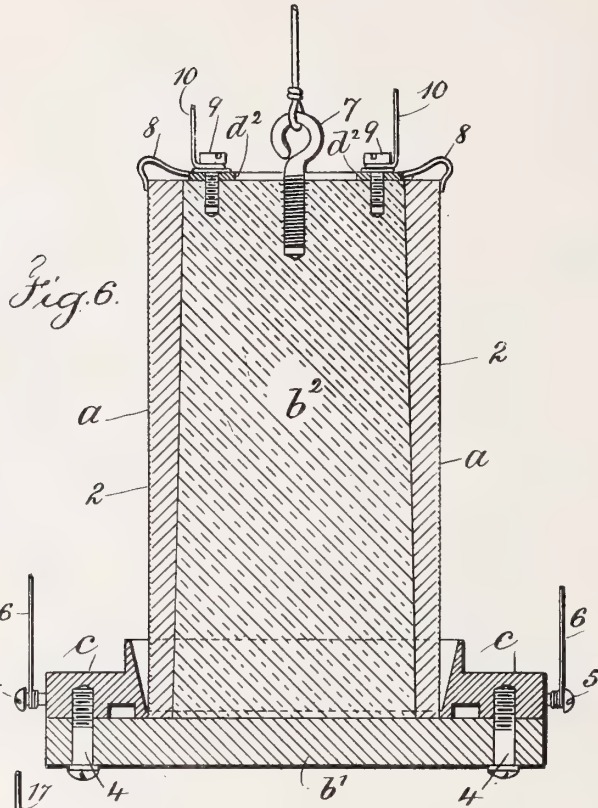
A. N. PETIT.

METAL MATRIX FOR FORMING DUPLICATE SOUND RECORD CYLINDERS.

APPLICATION FILED MAY 15, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses
Charles Smith
J. Staib

Inventor
Adenor N. Petit.
Per L. W. Serrell & Son
attys

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE INTERNATIONAL PHONOGRAPH AND INDESTRUCTIBLE RECORD COMPANY, LIMITED, OF LIVERPOOL, ENGLAND.

METAL MATRIX FOR FORMING DUPLICATE SOUND-RECORD CYLINDERS.

SPECIFICATION forming part of Letters Patent No. 739,713, dated September 22, 1903.

Application filed May 15, 1902. Serial No. 107,454. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented an Improvement in Metal Matrices for Forming Duplicate Sound-Record Cylinders, of which the following is a specification.

The object of my invention is to produce a superior matrix adapted to form a more perfect and commercial duplicate sound-record of cylindrical form and preferably made of celluloid than it has heretofore been possible to produce in an effort to overcome the harsh and grating sounds usually incident to records of sound in celluloid or similar materials.

In carrying out my invention I employ a master sound-record upon a cylinder of wax or other similar or suitable composition and prepare the surface for electrodeposition of a metal, such as copper, with a suitable conductive material. A suitable support is provided for the wax or other similar composition record and means for suspending the same in the bath in which the electrodeposition takes place. This support and the record during the electrodeposition of metal may be rotated, as I have discovered that superior results are obtained by revolving the record during the electrodeposition of the metal, as the same obviates any tendency to granulation.

A suitable apparatus is provided not only for the support of the record during its rotation, but for the electric apparatus conducting the current. I prefer to provide a suitable support for one end of the wax or other similar composition record, and the respective ends of the record are preferably surrounded by ring-like parts which form permanent portions of the matrix and are connected by the metal electrodeposit upon the surface of the wax or other similar composition record. These ring-like ends are both peculiarly formed for this purpose, and I prefer to insert between one of these rings and one end of the wax cylinder a device carrying the name of the record and which afterward gives form to the cylindrical and duplicate sound-

record formed in the matrix. After the matrix is formed and the wax record broken out or otherwise extracted therefrom the same is ready for the reception of the celluloid blank or blank of other suitable material which is to receive from the matrix the sound-record impressions from the inner surface thereof. The apparatus and the method of forming the duplicate sound-record cylinder in this matrix forms the subject of a separate application for Letters Patent of even date herewith.

In the drawings, Figure 1 is a vertical section showing the wax or other composition cylinder upon which is formed a master sound-record and the parts associated therewith preparatory to electrodepositing metal upon the surface thereof. Fig. 2 is a plan of the name or title ring. Fig. 3 is a vertical section of the matrix complete. Fig. 4 is a similar vertical section showing the celluloid blank placed within the matrix before the same is connected up in the apparatus described in said copending application. Fig. 5 is an inverted plan of the ring or annulus at the upper end. Fig. 6 is a vertical section of a modified form of the invention, showing the parts assembled for insertion into the chemical bath for the electrodeposition of the metal; and Fig. 7 is a vertical longitudinal section of a modified form of the invention, showing the wax cylinder upon which is the master-record suitably mounted for rotation in the chemical bath during the electrodeposition of the metal upon the surface thereof.

The wax cylinder *a* is of usual material and construction, with an engraved surface of a master sound-record, and the inner walls thereof may be parallel or tapering, as desired. The surface of this cylinder *a* is prepared with conductive material at 2. I provide a support or base *b* for use during the electrodeposition of metal; also, a ring or annulus *c*, of metal, receiving the lower end of the wax cylinder *a*, and a ring or annulus *d*, of metal, at the upper end of the wax cylinder, said parts *c* and *d* forming limit-gages at the ends of the wax cylinder and also permanent

ends for the matrix. The base b is provided with screws 4, passing through the same into interiorly-threaded openings in the ring or annulus c , whereby the two parts are removably connected. There are screws 5 in the base b and in the ring or annulus d , to which circuit-wires 6 are connected for conveying the electric current in the liquid bath or battery for the electrodeposition of the metal, and these circuit-wires 6 may also be suspending devices for said parts in said bath. The upper end of the wax cylinder a is preferably recessed, and I prefer to provide a name-plate 3, preferably of wax and adapted to fit into the upper end of the wax cylinder to close the same and also form a support and a centering structure for the metal ring or annulus d . This ring or annulus d is cut away on the under side from the periphery toward the center, so that when in place, as shown in Fig. 1, there is an appreciable space formed toward the axial center of the parts, said ring or annulus being of greater diameter than the wax cylinder a . The central opening of the ring or annulus c , receiving the lower end of the wax cylinder a , is outwardly flared or tapered, providing an annular wedge-shaped space between the surface thereof and the surface of the wax cylinder.

In forming the matrix in the bath by the action of the electric current the metal, such as copper, is not only deposited upon the conductive-material surface of the wax cylinder a and the surface of the name-ring 3, similarly prepared, but is also deposited upon the flared surface of the open center of the ring or annulus c and the under surface of the ring or annulus d , it being understood that the other metal surface of the associated parts are to be covered with varnish or some other material to prevent the electrodeposition of metal, except at the places desired and hereinbefore stated. The metal is to be deposited until it assumes a thickness substantially agreeing with the diameter of the ring or annulus d , after which the electrodeposited cylinder e , with rings or annuli c d , form an integral structure, which constitutes the matrix for further use and from which the wax cylinder with the record is broken out after removing the base or support b . This matrix is shown in Fig. 3, in which it will be noticed that the opening at the lower end is of the full diameter of the matrix, while the opening at the upper end is contracted and governed by the aperture in the ring portion d .

The celluloid blank f or blank of other suitable material is preferably made with one end turned over and the other end intumed, and this blank is appreciably smaller than the internal diameter of the matrix and is passed into the same from the lower larger end, (see Fig. 4,) it being understood that the turned-over end of the blank comes against the upper inclined portion of the matrix, at which place the matrix shows the name in relief.

In the modified form of my invention shown in Fig. 6 the base b' , similar to the base b , hereinbefore described, is provided with a core b^2 , integral therewith or connected thereto, and both parts are preferably of insulating or non-conducting material, and to the same is advantageously secured a screw-eye 7, from which the parts collectively are advantageously suspended in the bath or battery during the electrodeposition of metal. In this figure the wax cylinder a , with a conductive-material surface, the ring or annulus c , and the screws 4 are the same as the parts hereinbefore described. Upon the upper end of the core b^2 I secure a ring d^2 or its equivalent structure, provided with several radiating fingers 8, made integral therewith and extending over upon the upper surface of the wax cylinder a in contact with its conductive surface. This ring is preferably fastened to the core by screws 9, which also serve as binding-posts for the circuit-wires 10. Secured to the ring or annulus c are screws 5 and circuit-wires 6, similar to those parts employed in Fig. 1, the screws 5 and wires 6 and the screws 9 and wires 10, together with the ring d' and the fingers 8, constituting devices for a complete electric circuit through the annulus c and the conductive-material surface 2 of the cylinder.

In the modified form, Fig. 7, the base b' and the core b^2 are centrally perforated for a shaft 11, the same being rotatably hung in arms 12, suspended from any fixed point, said shaft being provided with a nut 14 to clamp the base b' and core b^2 to the shaft and between a collar thereon and said nut, and on this shaft is preferably placed a pulley 13, surrounded by a band for rotating the shaft, the base b' , core b^2 , the ring or annulus c , secured thereto by the screws 4, the wax cylinder a , surrounding the core b^2 , and a ring d^2 , placed against the right-hand end of the core b^2 and held thereto by the clamping of the nut 14. The said ring d^2 substantially agrees in diameter with the full diameter of the finished matrix, and in order to bring to the ring d^2 and the ring or annulus c the electric current in suitable form I provide brackets 15 16 upon the arms 12 and spring-contacts 17, which run upon the surfaces or peripheries of said ring or annulus c and the ring d^2 during the rotation of the parts in the bath or battery. The arms 12 are to be constructed for the ready separation therefrom of the base b' , core b^2 , and base connected therewith, so that the finished matrix may be removed and the wax cylinder broken out therefrom.

The matrix made as hereinbefore described is substantial, strong, and lasting and eminently adapted for continuous and repeated use in the manufacture of duplicate sound-records of celluloid or other suitable materials.

I have discovered that in the electrodeposition of the metal upon the surface of the

master-record when the same is in the bath the best results are obtained by starting the operation with one circuit-wire at one end until a substantial or appreciable thickness is obtained, because the electric action is continuous from one end to the other, whereas when two circuit-wires are employed the action of deposition is from both ends to the center. This latter manner of operation is satisfactory after the appreciable foundation is made, whereas if the action is commenced with two wires there will be an appreciable central line as a result, which is consequently detrimental.

I do not herein limit myself to the arrangement or number of the electric wires or circuits or to the metal end rings to which the electrodeposited metal unites when the parts are revolved in the bath or battery for forming the matrix and which constitute a part of the matrix.

I claim as my invention—

1. The combination with a base and a wax record-cylinder having a conductive-material surface, of a ring or annulus of metal secured to the base receiving one end of the record-cylinder and having a tapering central surface adjacent to the record-cylinder, a ring or annulus and a support for the same at the upper end of the record-cylinder, said ring having a tapering under surface and a body of electrodeposited metal upon the surface of the record-cylinder at its ends joining the said rings or annuli and therewith forming an integral matrix, substantially as set forth.

2. The combination with a base and a wax record-cylinder having a conductive-material surface, of a ring or annulus of metal secured to the base, receiving one end of the record-cylinder and having a tapering central surface adjacent to the record-cylinder, a ring or annulus and a support for the same at the

upper end of the record-cylinder, said support having an inclined outer surface engraved with the name of the record, which name is afterward transferred to the inner surface of the matrix, said ring having a tapering under surface and a body of electrodeposited metal upon the surface of the record-cylinder at its ends joining the said rings or annuli, the said rings or annuli therewith forming an integral matrix, substantially as set forth.

3. A metal matrix adapted for the reproduction of duplicate sound-record cylinders of celluloid or similar material, the same comprising ends formed of metal rings or annuli and an intermediate portion of electrodeposited metal joined therewith by the electrodeposition of the metal as an integral whole.

4. The combination with a base and a wax record-cylinder having a conductive-material surface, of a ring or annulus of metal secured to the base receiving one end of the record-cylinder and having a tapering central surface adjacent to the record-cylinder, a body of electrodeposited metal upon the surface of the record-cylinder joining the tapering central surface of the ring or annulus at one end and therewith forming an integral matrix.

5. A metal matrix adapted for the reproduction of duplicate sound-record cylinders of celluloid or similar material, the same comprising a ring or annulus and a body portion of electrodeposited metal joined thereto at one end by the electrodeposition of the metal and constituting an integral whole, substantially as set forth.

Signed by me this 6th day of May, 1902.

ADEMOR N. PETIT.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.

739.957

No. 739,954.

PATENTED SEPT. 29, 1903.

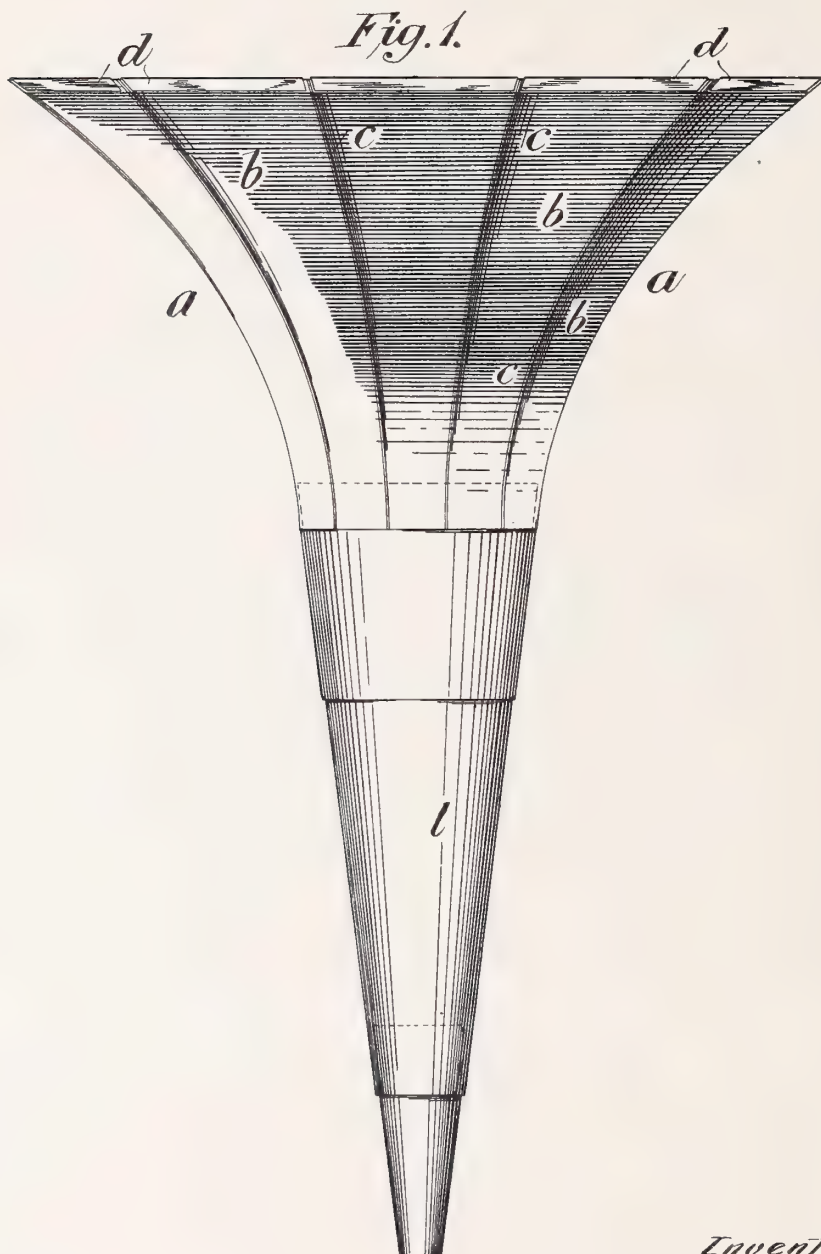
G. H. VILLY.

HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.

APPLICATION FILED DEC. 8, 1902:

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:
L. Hilton
A. Veazie

Inventor:
Gustave H. Villy
By *H. Blomson & Co.*
Attorneys.

No. 739,954.

PATENTED SEPT. 29, 1903.

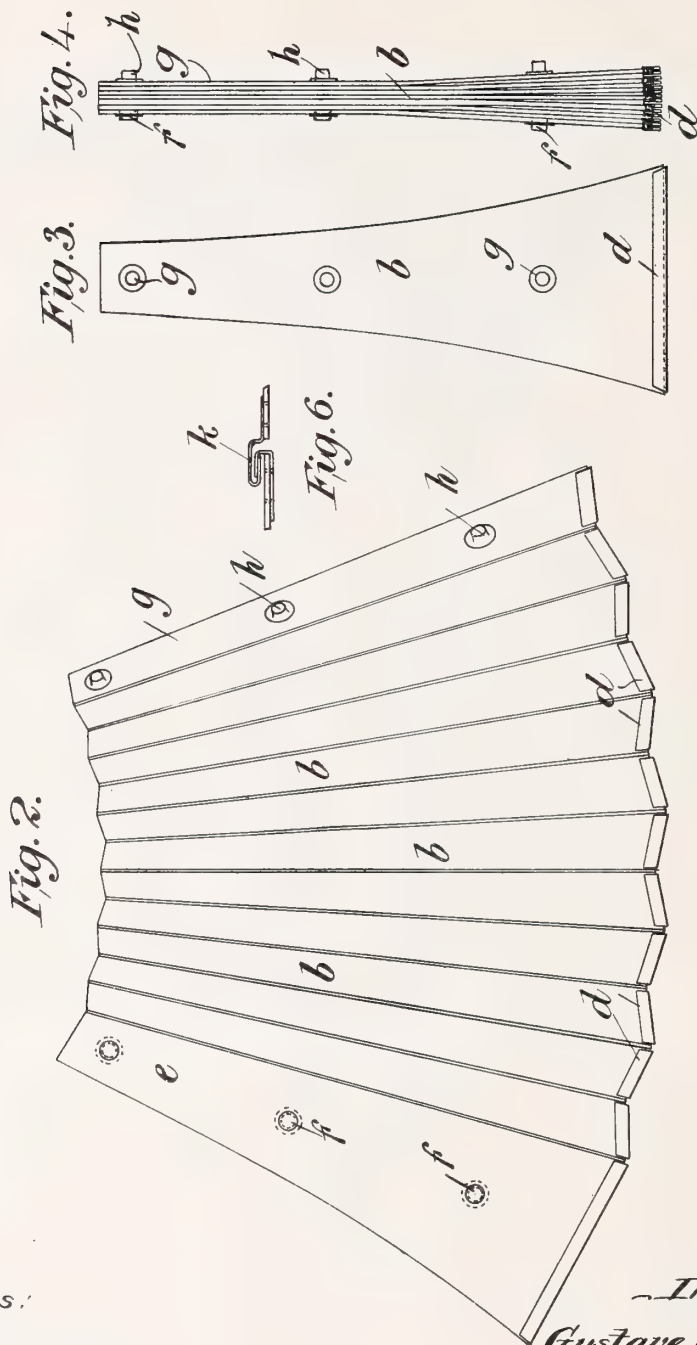
G. H. VILLY.

HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.

APPLICATION FILED DEC. 8, 1902.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:
L. Hilton
A. Veazey

Inventor:
Gustave H. Villy
By *H. B. Wilson & Co.*
Attorneys -

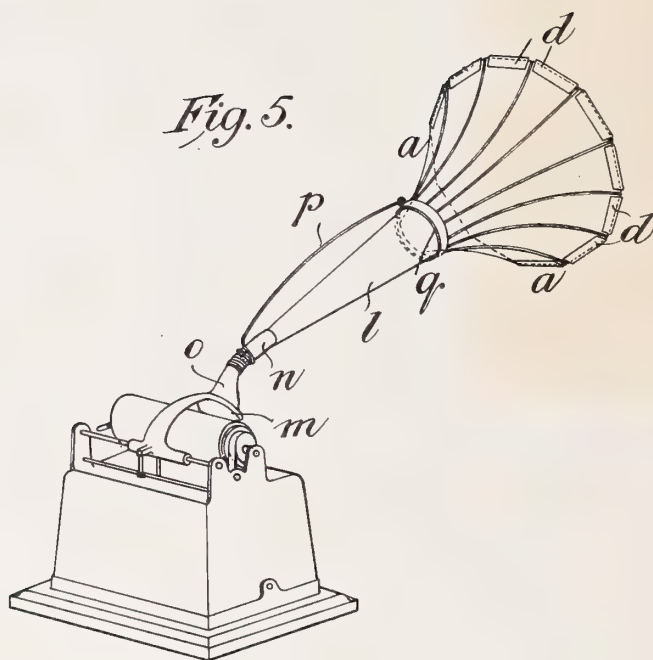
No. 739,954.

PATENTED SEPT. 29, 1903.

G. H. VILLY.
HORN FOR PHONOGRAPHS, EAR TRUMPETS, &c.
APPLICATION FILED DEC. 8, 1902.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses
L. Hilton
A. Teague

Inventor—
Gustave H. Villy—
By *A. W. Wilson & Co*
Attorneys

UNITED STATES PATENT OFFICE.

GUSTAVE HARMAN VILLY, OF MANCHESTER, ENGLAND.

HORN FOR PHONOGRAPHS, EAR-TRUMPETS, &c.

SPECIFICATION forming part of Letters Patent No. 739,954, dated September 29, 1903.

Application filed December 8, 1902. Serial No. 134,413. (No model.)

To all whom it may concern:

Be it known that I, GUSTAVE HARMAN VILLY, a subject of the King of Great Britain and Ireland, residing at 5 Longford Place, Longsight, Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Connection with Horns for Phonographs, Ear Instruments, and for Like Purposes, (for which I have made application for Letters Patent in Great Britain, No. 20,146, and dated 15th day of September, 1902,) of which the following is a specification.

This invention relates to improvements in connection with horns or trumpet-like sound distributors or collectors for use upon phonographs, gramophones, and other like instruments and also for ear-trumpets, fog-horns, and other sound distributing and collecting devices, the object being to provide a horn or trumpet-like device which can be folded when not in use, so as to be capable of ready transportation and for placing within the case of the phonograph or in the pocket of the user when it is to be applied to an ear instrument or the like.

The accompanying drawings represent one form of the invention.

Figure 1 is an elevation of the complete or erected horn. Figs. 2, 3, and 4 are detail views illustrating the manner in which the horn can be collapsed or folded. Fig. 5 is a perspective view illustrating one convenient application of the improved horn to a phonograph. Fig. 6 is a detail view on an enlarged scale.

In carrying my invention into effect in one convenient manner when making my folding horn for use, particularly in connection with a phonograph or like instrument, I make the end *a* of trumpet-like or curved configuration with an enlarged outer end and a smaller end at the interior of the conoidal-like form. I make this enlarged and trumpet-like device by employing a series of strips *b*, of paper, wood, linen, or other preferably flexible material, the foundations of which I prefer to make of linen or the like, so as to form a hinge-like connection *c* between each of the strips, the members *b* of which I arrange so that while lying close together when extended

there is a dividing-line between them about which they can be folded upon the base of linen or the like connecting-web upon which the paper or other material is mounted. The longitudinal hinged edges *c* of the flexible segments or sectors *b* are curved in such manner that although the segments when opened out cannot lie in the same plane they can either be folded together in a zigzag manner, so as to lie parallel to one another, as shown in Figs. 2 to 4, or extended by springing or buckling into the requisite trumpet or bell-like form, as shown in Figs. 1 and 5. The angles formed by the meeting of the hinged segments when extended form, as it were, ribs, giving rigidity to the trumpet form. The outer ends of the segmental-like strips I prefer to protect by a bent or turned-over edging *d* of metal, making the connection rigid by pressing a portion of the strip of metal or other binding material into the edge of the paper or the like foundation.

Upon the extreme member *e* of the series of strips *b* thus formed into one band I provide eyelets for other clip-like devices for enabling snap projections *h* on the opposite end strip *g* to be engaged therewith and when thus engaged to form a completed trumpet-like sound-distributor.

Instead of arranging eyelets or hook-like clips upon the outer members of the series of strips I may make one to engage with the other by forming a bead-like connection or flange *k* upon one member, into which the corresponding projecting or engaging portions of the other may enter, as shown in Fig. 6. When providing for an extension and a long funnel-like carrier for the built-up trumpet-like end *a* to engage with, I sometimes make a conical tube *l*, the enlarged end of which engages with the inner end of the trumpet-terminal *a*, while the smaller end of the cone engages with the receiver *m* of the phonograph or enters into the rubber or other tubular or flexible connection which may be employed for use upon any particular instrument. I prefer to make this extended or carrying member *l* for the collapsible trumpet from paper or other suitable material built up in a similar manner to that hereinbefore described to my collapsible end, or the

cone may be made in a short length in one piece, or it may be made telescopic when so desired.

When providing for a flexible connection at the extreme end of the cone *l*, I attach a length of rubber or the like tubing *n*, which I bind with metal or other band at the end for the purpose of inserting it upon the funnel *o* of the phonograph-reproducer, and I stiffen the combination trumpet and funnel with flexible end by providing one or more bars *p* of metal or the like stiffeners which support the funnel by means of elastic or other connections *q*, arranged upon the cone end and suspended from the projecting stiffening hook or members *p*, carried from the metal end or binder of the flexible tube *n*.

When constructing a funnel or tube for an ear-trumpet or for a fog or speaking horn or the like, I employ the same method of building up the segments to form the expanding-surface, modifying the arrangement of the inner end to suit the connection that is to be made therewith, so that when the trumpet is in use it can be extended and a large outer area exposed for the collection of sound and when not in use it can be folded, each segment upon the other, so as to occupy but little space—that is to say, a trumpet such as illustrated in Figs. 1 to 4 would be suitable as an ear-trumpet.

I am aware that it has hitherto been proposed to form conical or pyramidal horns from cardboard provided with a linen foundation; but such horns have been made up from a single flat scored sheet or from a number of flat triangular strips having straight edges. Such horns could be developed or laid out upon a flat surface. Owing to their formation if such horns were made collapsible they would have to be sustained in their conical form by additional sustaining means, or if they were made self-sustaining they could not be made collapsible. In contradistinction to this my collapsible horn could not be made up from a single flat sheet, as each strip has to be made with curved edges, and when the strips are flexibly secured together at such curved edges the whole or complete surface so formed cannot be laid out or developed on a flat surface. My horn, owing to the curvature of the edges of the strips, is self-sustaining and requires no additional stiffening or sustaining devices, although when it is desired to collapse the horn this may be effected by forcibly straightening and folding the strips one against the other in the manner hereinbefore described with reference to Figs. 2, 3, and 4. The horn when erected offers a decided resistance to such straightening or folding sufficient to render it self-sustaining against all ordinary shocks liable to be encountered; but it is found that when one strip has been forcibly straightened or folded

against another the equilibrium of the trumpet is destroyed and the whole may be easily collapsed.

I do not limit the application of my invention to any particular method of building up the segments or to any special curve or configuration of the same, and I vary the method of jointing and stiffening them to suit the material from which the strips are constructed and the foundation or base fabric upon which the flexible material forming the strips is secured.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprised of a number of flexible strips having curved meeting edges substantially as set forth.

2. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges and mounted on a flexible foundation, substantially as and for the purposes hereinbefore set forth.

3. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges, a flexible foundation for said strips and means for detachably securing the two extreme strips together, substantially as set forth.

4. A collapsible but self-sustained phonograph-horn, ear-trumpet or the like comprising a number of flexible strips having curved meeting edges, flexible connections between such edges and protecting means on the outer exposed edges, substantially as set forth.

5. A phonograph-horn, ear-trumpet or the like comprising a rigid conical tube and a collapsible trumpet-shaped mouth the latter being made up of a number of flexible strips having curved meeting edges, and flexible connections at such edges, substantially as hereinbefore set forth.

6. A horn of the class described comprising a rigid conical tube, and a collapsible trumpet-shaped mouth made up of a number of flexible strips having curved meeting edges, said mouth being connected to said rigid conical tube, substantially as described.

7. A horn of the class described comprising a rigid conical tube, and a collapsible trumpet-shaped mouth made up of a number of flexible strips having curved meeting edges, said mouth being telescopically connected to said conical tube, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GUSTAVE HARMAN VILLY.

Witnesses:

DORA VILLY,
V. A. B. HUGHES.

UNITED STATES PATENT OFFICE.

BERNHARD KLEPPER, OF BROOKLYN, NEW YORK.

PROCESS OF REMOVING SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 741,047, dated October 13, 1903.

Application filed February 28, 1902. Serial No. 96,174. (No specimens.)

To all whom it may concern:

Be it known that I, BERNHARD KLEPPER, a citizen of the United States, residing in the borough of Brooklyn, city and State of New York, have invented a new and useful Process for Removing the Sound-Records from Phonograph-Cylinders, &c., of which the following is a specification.

My invention relates to a process for removing sound-records from cylinders, tablets, disks, &c., other than metal which are employed in phonographs, graphophones, and similar instruments. Heretofore such sound-records have been removed by means of a tool which shaved or otherwise removed the irregularities which constituted the record. After the sound-records were removed the cylinder, tablet, disk, &c., could be used to receive a new record.

According to my process the sound-records are removed or obliterated by applying to the cylinder, tablet, or disk a solution which will dissolve or soften the material comprised in the surface of the cylinder, tablet, disk, &c., to such a degree that the material may be worked. In this dissolved or softened condition the material can be smoothed, thereby obliterating the record and producing a surface upon which a new record can be made.

In carrying out my process I preferably employ a solution containing turpentine, wax, and spermaceti in the following proportions: turpentine, seven parts; wax, one-sixteenth part; spermaceti, one-sixteenth part. On the application of this solution to a cylinder, &c., containing a record the turpentine acts to dissolve or soften the surface material of the cylinder, &c., which may then be rubbed with a suitable fabric, such as cloth or felt, or otherwise worked to obliterate the record and to produce a smooth surface. The wax in the composition acts as a filler, while the spermaceti acts to produce a polish. Linseed-oil and litharge may be added to this solution, if desired. The litharge acts to harden the material after it has been worked.

My process may be conveniently carried out by applying a little of the solution to a cloth and then rubbing the cylinder, tablet, disk, &c., until all trace of the record has been removed.

What I claim as my invention is—

1. The herein-described process for removing a sound-record from a phonograph cylinder, tablet, disk, or the like, which consists in applying a solution containing a solvent and a filler to the cylinder so that the solvent acts to soften or dissolve the surface material of the phonograph-cylinder, or the like, and then working the filler into the softened material to destroy or obliterate the sound-record and produce a smooth surface, substantially for the purposes set forth.

2. The herein-described process for removing a sound-record from a phonograph cylinder, tablet, disk, or the like, which consists in applying turpentine to the surface material of the phonograph cylinder, tablet, disk, or the like, to soften it and then working a filler into the softened material to obliterate the sound-record, substantially for the purposes set forth.

3. The herein-described process for removing a sound-record from a phonograph cylinder, tablet, disk, or the like, which consists in applying turpentine and wax to the surface material of the phonograph cylinder, tablet, disk, or the like, to soften it through the medium of the turpentine and then working the said wax into the softened material to obliterate the sound-record, substantially for the purposes set forth.

4. The herein-described process for removing a sound-record from a phonograph cylinder, tablet, disk, or the like, which consists in applying a solution consisting of turpentine, wax and spermaceti to dissolve or soften through the medium of the turpentine, the material of the phonograph-cylinder, or the like, and then working the said wax into the dissolved or softened material to obliterate the sound-record and to produce a smooth surface through the medium of the spermaceti, substantially for the purposes set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BERNHARD KLEPPER.

Witnesses:

GEO. E. CRUSE,
JOS. P. McELDUFF.

741, 547

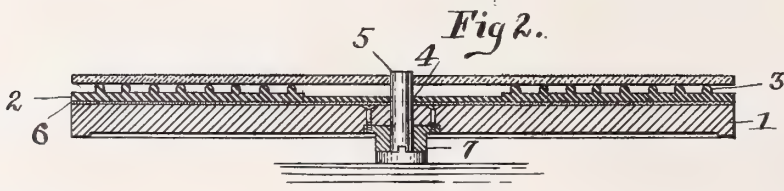
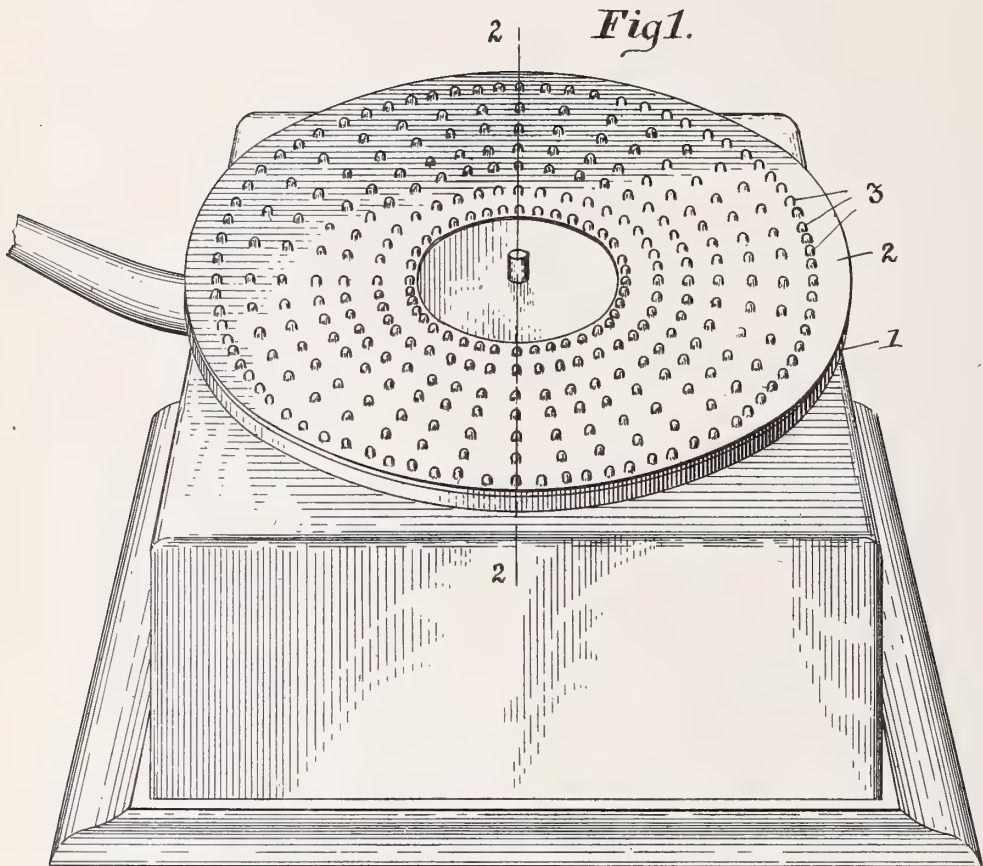
741247

No. 741,247.

PATENTED OCT. 13, 1903.

E. R. JOHNSON.
TURN TABLE FOR TALKING MACHINES.
APPLICATION FILED MAR. 14, 1902.

NO MODEL.



WITNESSES:

Edw. W. Vaill Jr.

Chas. R. Bennett

INVENTOR:

Eldredge R. Johnson.

By *H. M. Pettit*
ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

TURN-TABLE FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 741,247, dated October 13, 1903.

Application filed March 14, 1902. Serial No. 98,158. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, residing at Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Turn-Tables for Talking-Machines; and I do declare the following to be a full and complete disclosure of the same.

In general my invention consists in providing a turn-table for talking-machines with a pad having flexible nibs, whereby the record is held in position without the use of clamps, screws, or nuts and also whereby the support for the record-disk is made slightly yielding.

For a full and detailed description of the invention reference may be had to the following specification and to the accompanying drawings, in which—

Figure 1 is a perspective view of the turn-table and motor-casing; and Fig. 2 is a sectional view of the turn-table, taken substantially upon the line 2 2 of Fig. 1.

In the drawings, 1 represents a turn-table of the usual form, having rotatable connection with the motor-spindle 7. Upon the upper surface of the table is secured a soft-rubber pad 2, having a comparatively large number of rounded projections or nibs 3, which extend upwardly to substantially the same height. This pad may have the usual backing 6, of baize or other fabric. A stud 5 projects from the motor-driving spindle through the turn-table and pad and is adapted to pass through the center opening in the record-disk to center the same. All that is necessary to secure a record in position to produce sound is to place the same over the central stud 5, allowing the under surface of the record to rest upon the nibs or projections 3. Owing to the peculiar frictional contact between the lower surface of the record and the projections, the record will be held from turning

independently of the table and will be positively rotated with the same.

It will be apparent that this form of table has the advantage over the usual tables having plain pads of felt or other yielding material in that the nibs prevent air being confined between the surface of the pad and that of the record, thereby reducing the friction. It will be noticed that should the record slip slightly the nibs would have to a small extent a rolling action, and thereby new points of contact would be formed.

Slight changes in detail may be made without departing from the spirit of my invention, and I do not wish to be limited to the exact details herein set forth; but

What I do claim, and desire to protect by Letters Patent, is—

1. A turn-table for talking-machines comprising a rotatable disk, a flexible pad secured to its upper surface, said pad having a comparatively large number of small flexible nibs projecting from its upper surface, substantially as described.

2. A turn-table for talking-machines comprising a rotatable disk, a soft-rubber pad secured to its upper surface said pad having a comparatively large number of small flexible integral nibs projecting from its upper surface, substantially as described.

3. In combination, a turn-table for talking-machines, comprising a rotatable disk, a soft-rubber pad secured to its upper surface, said pad having a comparatively large number of small flexible nibs projecting from its upper surface, and a record-disk resting upon said nibs, substantially as described.

In witness whereof I have hereunto set my hand this 10th day of March, A. D. 1902.

ELDRIDGE R. JOHNSON.

Witnesses:

S. V. COXETTER,
J. K. MUNNERLYN.

741 147.

741, 462

W. E. CLIFTON & B. OAKSFORD.
PHONOGRAPH OR GRAPHOPHONE, &c.

APPLICATION FILED AUG. 2, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

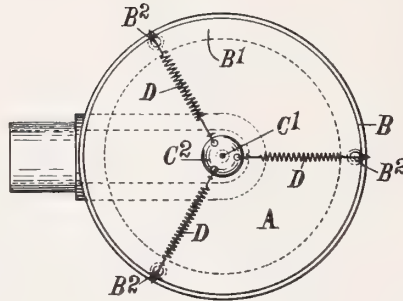


Fig. 2.

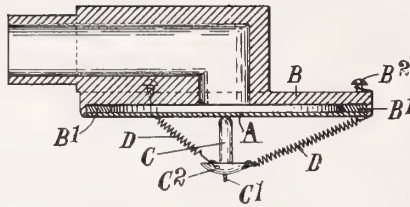


Fig. 3.

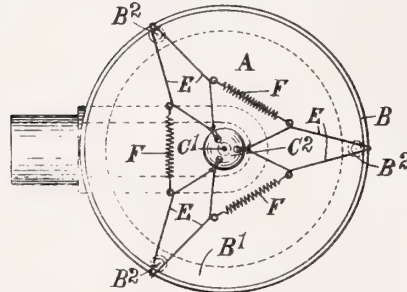
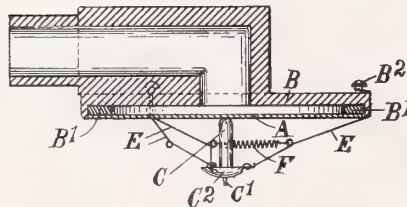


Fig. 4.



Witnesses
Samuel J. Gillman Jr.
W. J. G. G. G.

Inventors
William Ernest Clifton
Bertie Oakford
by
Frank E. Freeman
Attorney

No. 741,462.

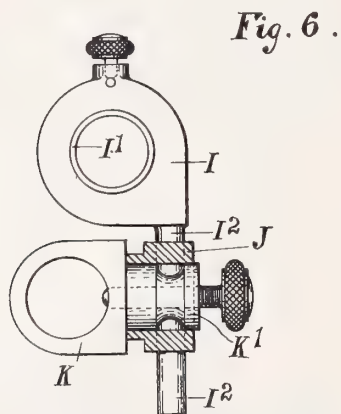
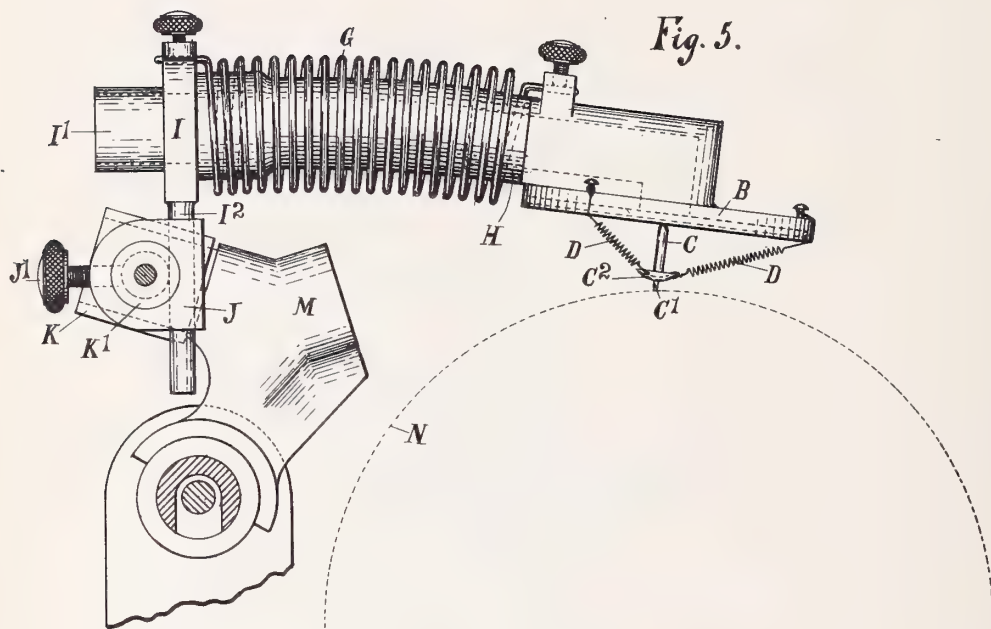
PATENTED OCT. 13, 1903.

W. E. CLIFTON & B. OAKSFORD.
PHONOGRAPH OR GRAPHOPHONE, &c.

APPLICATION FILED AUG. 2, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



Witness
Samuel L. Hillman, Jr.
Attorney

Inventors
William Ernest Clifton
Bertie Oakford
by
Fiske & Freeman,
Attorneys

UNITED STATES PATENT OFFICE.

WILLIAM ERNEST CLIFTON AND BERTIE OAKSFORD, OF NOTTINGHAM,
ENGLAND.

PHONOGRAPH OR GRAPHOPHONE, &c.

SPECIFICATION forming part of Letters Patent No. 741,462, dated October 13, 1903.

Application filed August 2, 1902. Serial No. 118,126. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM ERNEST CLIFTON and BERTIE OAKSFORD, subjects of the King of Great Britain, and residents of Nottingham, England, have invented certain new and useful Improvements in Phonographs, Graphophones, or Like Sound Recording and Reproducing Instruments, of which the following is a specification.

10 This invention relates to the recording and reproducing mechanism of sound recording and reproducing instruments, such as phonographs, graphophones, or the like.

The object of this invention is to provide 15 the stylus or recording-tool of such mechanism with a movement against a predetermined resistance in the plane of the surface of the record, so that the said stylus or recording-tool can give way or yield to the lateral pressure it receives from the record as it rotates and neutralize any false vibrations set up from this cause and at the same time transmit the vibrations from the record direct to the diaphragm, or vice versa. Its further object 25 is to hold the diaphragm in position without stiffening or cramping it, so that it can vibrate freely.

Referring to the drawings, Figure 1 is a view of the under side, and Fig. 2 a sectional elevation, of recording or reproducing mechanism constructed according to our invention. Fig. 3 is a view of the under side, and Fig. 4 a sectional elevation, of recording or reproducing mechanism, showing a structural modification. Fig. 5 is a side elevation illustrating a method of holding and supporting the sound-box so as to give the same result. Fig. 6 is an end elevation of the adjustable attachment.

40 Like letters indicate like parts throughout the drawings.

According to one method of carrying out our invention the diaphragm A (see Figs. 1 to 4) of a phonograph or graphophone sound recorder or reproducer is placed in the recess in the sound-box B with an india-rubber or like washer or packing-ring B' between the said diaphragm and the bottom of the recess. The diaphragm A is held in this position by 50 an external pillar C, the inner end of which

bears on the center of the diaphragm A, while its outer end is provided with either a reproducing-stylus C', as shown, or a recording or cutting tool.

Referring to Figs. 1 and 2, the pillar C is held 55 in position by three or any other suitable number of elastic radial stays D, which may each be formed of an elastic substance or, as shown, by coiling a wire of the requisite strength into a spiral spring. The inner end of each 60 stay D is connected to a collar C² near the outer end of the pillar C and their outer ends to studs B² on the sound-box B. The inner end of the pillar C is thus held firmly on the center of the diaphragm A and the latter on 65 its seat on the packing-ring B', solely by the action of the elastic stays D, and its action is not cramped or limited, as is the case when either a fixing ring or gasket or an adhesive substance is used. The outer end of the pillar C, carrying the stylus C' or reproducing-tool, may also with this arrangement move to a limited extent about its inner end, which rests on the diaphragm A against the resistance offered by the elastic stays D, and the stylus or tool can thus give way or yield 75 in the plane of the surface of the record when the nature of the recording-line on the surface of the latter causes lateral pressure to be exerted on the former, while the pillar 80 maintains a rigid vertical connection between the record and diaphragm.

Referring to Figs. 3 and 4, the pillar C is held in position by flexible but inelastic stays D, arranged radially, as previously described. 85 These stays D are arranged in pairs, as shown, and they are held taut by springs F, arranged in the angular space between each pair of stays. The ends of these springs F are connected to the stays on each side of the angular space at a point midway between 90 their ends, as shown, and said springs thus pull the stays out of the radial line and hold them taut. Lateral pressure on the stylus or recording-tool tends to pull the stays D on one side into the radial or straight line against the action of the springs F, while those on the opposite side are pulled by the springs farther out of the radial line to take up any slackness. This arrangement acts in pre- 100

cisely the same manner as that previously described, but it is a little stronger in construction and is therefore better fitted for rough usage.

- 5 If preferred, the inner end of the pillar C may be formed with a knife-edge, and a metal seat, which may take the form of a ring or annulus, is secured on the center of the diaphragm for the said knife-edge to rest upon.
- 10 The same result may be obtained by employing the device shown in Figs. 5 and 6, which is constructed so that it may be attached to the ordinary tube connection or fixture used at the present time on the well-known "graphophone" or similar machines.

- 15 In the arrangement shown the sound-box B is connected to the outer end of a coiled spring G, through which latter the connecting-tube H is carried for convenience. The inner end of the spring G is attached to a part I, provided with a tube connection I' and a stalk I². The stalk I² is mounted in a tangential hole in a boss J, mounted on a pin or extension K' on a bracket K, which latter is adapted to fit on the ordinary tube connection or fixture M. The stalk I² is adjustable in the boss J, and the latter is adjustable about the pin K', both being locked by one screw J' in the boss J. A vertical and angular adjustment is thus provided, and the part I to which the spring G is attached may thus be adjusted so as to increase or diminish the pressure of the stylus C' on the record N. The spring G in this case also permits of the stylus or recording-tool moving or yielding in any direction in the plane of the surface of the record, but such movement is not independent of the sound-box, as in the first-described arrangement, but the whole moves together against the action of the spring G. The tube H is elastic, so that it does not interfere with the action of the spring G, which latter may be incorporated in the wall of the tube H, or the said tube H may be made of india-rubber and with walls of sufficient strength to form an elastic arm without the aid of a spring. This arrangement may be used with recorders or reproducers of any construction, but the best results are obtained by combining both the arrangements described, as shown in Fig. 6, as with the first-mentioned arrangement the pressure of the stylus on the record must be accurately adjusted and at the same time be free to follow any irregularities in the track on the latter. This result is best obtained by supporting the reproducer on the outer end of an elastic arm, such as that provided by the spring G, which partially supports the reproducer, and thus takes some of the weight from and relieves the record.

- 20 The yielding movement of the stylus in the plane of the surface of the record reduces the wear on the latter and the production of natural and non-metallic tones and a better balance between the treble and bass notes is obtained.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In recording or reproducing mechanism of phonograph, graphophone or like sound recording and reproducing instruments, the combination of a sound-box, a stylus or recording-tool, and flexible supporting means which is also elastic in the direction of its length so that the stylus or recording-tool can move in any direction and more particularly in a direction parallel both to the surface of the record and its plane of rotation against the resistance offered by the said supporting means, substantially as described.

2. In recording or reproducing mechanism of phonographs, gramophones or like sound recording and reproducing instruments, the combination of a sound-box, a diaphragm in said box, a stylus or recording-tool, a pillar to carry the same, and springs supporting said pillar arranged radially, their inner ends being connected to the outer end of the pillar and their outer ends to the exterior of the sound-box, substantially as described.

3. In recording or reproducing mechanism of phonograph graphophone or like sound recording and reproducing instruments, the combination of a sound-box, a diaphragm in said box a stylus or recording-tool, a pillar to carry the same having its inner end resting on the diaphragm, pairs of flexible supporting-stays connected to said pillar and sound-box respectively and yielding means for holding said stays taut, substantially as described.

4. In recording or reproducing mechanism of phonograph, graphophone or like sound recording and reproducing instruments, the combination of a sound-box, a diaphragm in said box, a stylus or recording-tool, a pillar to carry the same having its inner end resting on its diaphragm, pairs of flexible supporting-stays connected to said pillar and sound-box respectively, and springs interposed between pairs of said stays in order to pull them out of the radial line and hold them taut, substantially as described.

5. In recording or reproducing mechanism of phonograph, graphophone or like sound recording and reproducing instruments, the combination of a sound-box, a diaphragm, a stylus or recording-tool in connection with the diaphragm, an arm which is flexible and elastic in the direction of its length for supporting the sound-box so that it can move in a direction longitudinally to the arm and parallel to both the surface of and the plane of rotation of the record, and means for adjusting the said arm, substantially as described.

6. In recording or reproducing mechanism of phonograph, graphophone or like sound recording and reproducing instruments, the combination of a sound-box, a diaphragm in said box, a stylus or recording-tool, a pillar for carrying the same having its inner end

resting on the diaphragm, elastic stays for supporting the outer end of said pillar, a horizontal arm which is flexible and elastic in the direction of its length for supporting the sound-box, and means for vertically and angularly adjusting said arm, substantially as described.

In testimony whereof we have signed our

names to this specification in the presence of two subscribing witnesses.

WILLIAM ERNEST CLIFTON.
BERTIE OAKSFORD.

Witnesses:

MARK SHAW,
ALFRED CLARKE.

741462

741.500

No. 741,500.

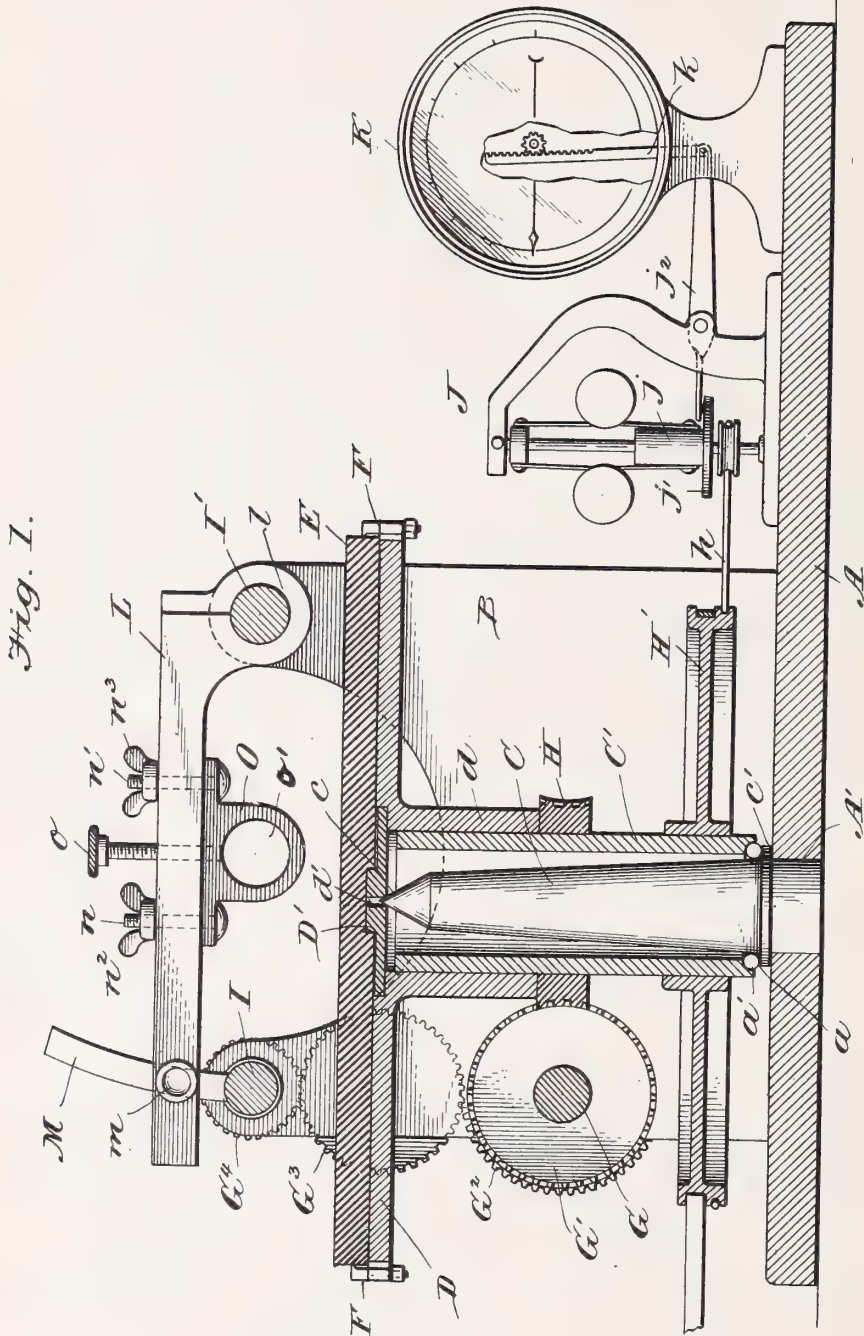
PATENTED OCT. 13, 1903.

E. R. JOHNSON.
SOUND RECORDING MACHINE.

APPLICATION FILED JAN. 20, 1900.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses.
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J. Henderson

Inventor,
Eldridge R. Johnson
By *1 Home Peas.*
Attorney.

No. 741,500.

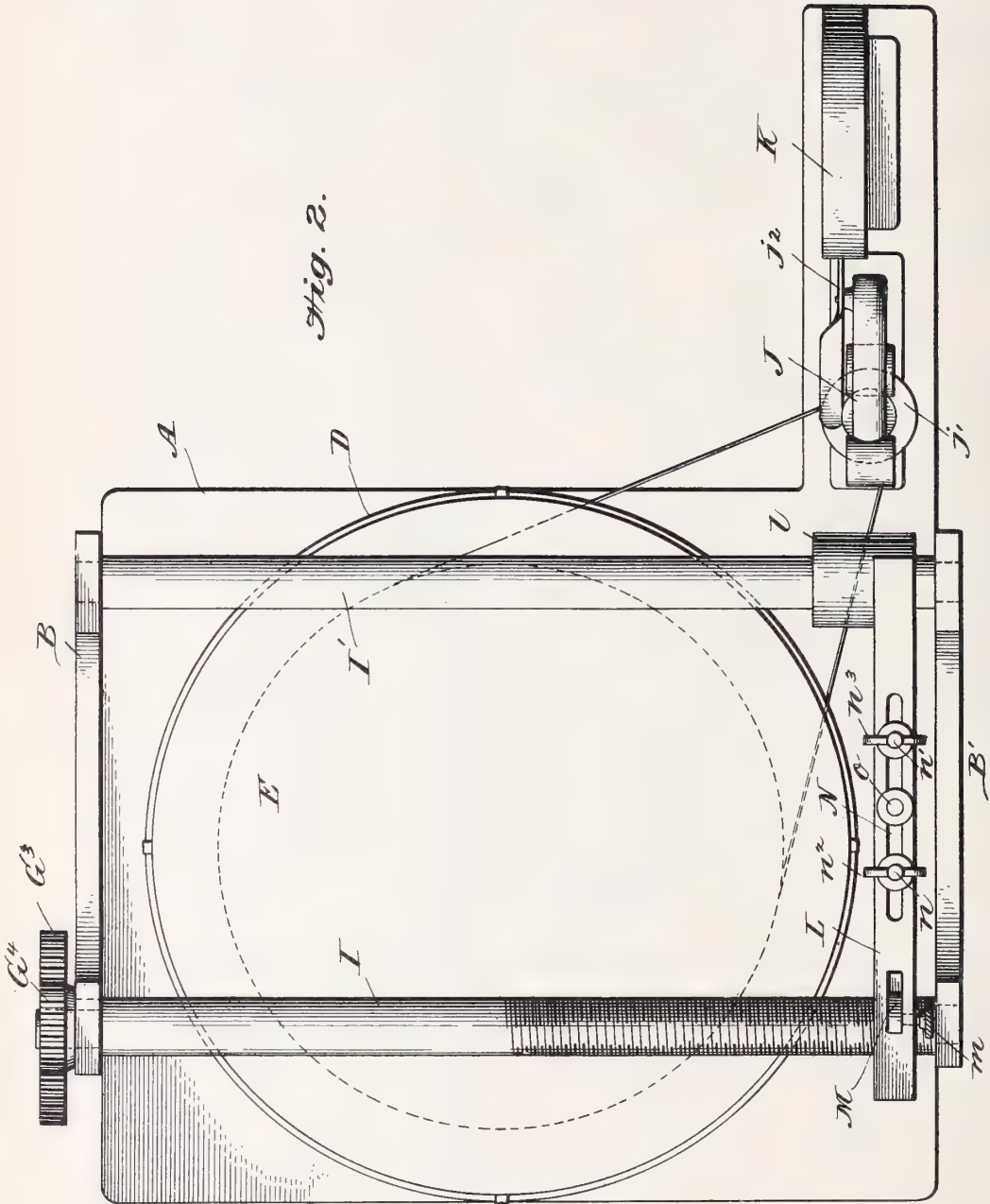
PATENTED OCT. 13, 1903.

E. R. JOHNSON.
SOUND RECORDING MACHINE.

APPLICATION FILED JAN. 20, 1900.

NO MODEL.

3 SHEETS—SHEET 2.



Inventor.

Witnesses.
John T. Cross
J. Henderson

Eldridge R. Johnson,
By 1 June 1903.
Attorney.

E. R. JOHNSON.
SOUND RECORDING MACHINE.

APPLICATION FILED JAN. 20, 1900.

NO MODEL.

3 SHEETS—SHEET 3.

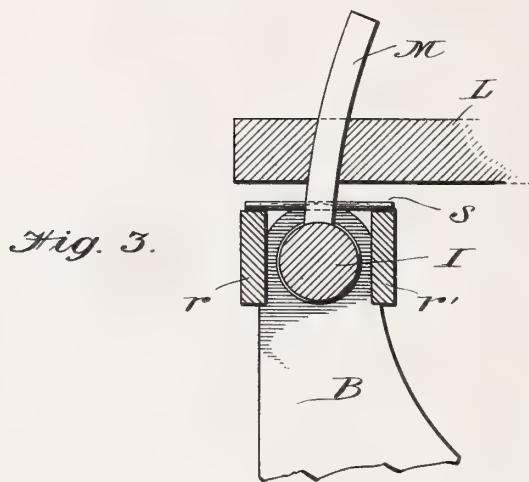


Fig. 4.

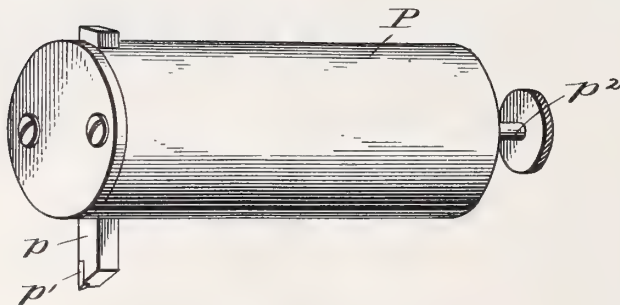


Fig. 5.

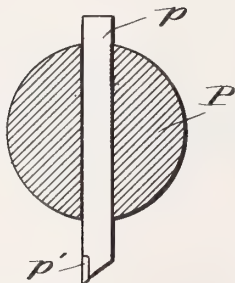
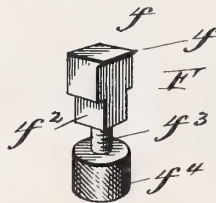


Fig. 6.



Inventor.

Eldridge R. Johnson,
by 1 time Peter
Attorney.

Witnesses.

Geo. T. Cross,
J. Henderson.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

SOUND-RECORDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 741,500, dated October 13, 1903.

Application filed January 20, 1900. Serial No. 2,173. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Sound-Recording Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improved sound-recording apparatus for recording sound-waves upon a record such as is used upon machines commercially known as the "gramophone," but which may also be applicable to other machines of a similar character.

The principal object of my invention is to provide an improved construction of machine for recording the sound-waves upon the recording material in undulatory lines of substantially even depth, having the record formed in the sides of the grooves.

A further object of my invention is to provide means for adjusting and truing the sound-recording mechanism and for planing and truing the record material before the recording operation.

Various other uses and advantages will be apparent upon reference to the following description and drawings.

Referring to the drawings, in which similar letters of reference are used to indicate similar parts, Figure 1 is a sectional elevation of my improved recording apparatus. Fig. 2 is a top plan view of the same. Fig. 3 is a detail sectional elevation of the adjustable half-nut used for feeding the sound-box support, showing a slight modification, which is employed when the planing-tool is used before the record operation. Fig. 4 is an enlarged detail perspective of the planing-tool and its holder. Fig. 5 is a cross-sectional view through the tool-holder. Fig. 6 is a detail perspective view of one of the clamps for holding the record-tablet on its supporting-table.

In carrying out my invention I provide a supporting-frame, comprising a main base-plate A and the side plates B B'. Fitted in an opening formed in the center of the base-

plate A is a spindle C, which tapers slightly toward its upper end and is provided with a pointed head *c*. Around the lower portion of the said spindle C is a flange *c'*, which rests upon the base A around the opening A' and has formed on its upper surface a ball-race adapted to receive a series of balls *a'*, which are held in position by means of a sleeve C'. Rigidly secured to the upper end of the sleeve C' is the turn-table D, having the flange *d* surrounding the upper portion of the said sleeve C', which may be keyed or otherwise secured to the said sleeve, so as to revolve therewith. The central portion of the turn-table D is provided with a circular offset, in which the centering-disk D' is fitted, the said centering-disk being provided in its center with a small opening *d'*, into which fits the pointed head of the spindle C, thus forming a pivotal bearing for the upper end of this spindle. The disk D' is also provided with an annular boss in its center, adapted to fit in an opening formed in the bottom of the record-disk for centering the same.

E designates the record-disk or recording material, which is composed of a wax-like material which may be readily cut by the operation of the sound-waves upon the cutting-stylus and is of such character that the chips or material cut out will not adhere to any appreciable extent to the record-surface and may thus be readily removed or brushed off. The composition forming the record material should also be of such a character that the walls of the record-groove may readily withstand the rubbing action of the reproducing-style without injuring or defacing the record for the purpose of testing the said record before the process of duplicating and multiplying the same is continued, as it is essential in the manufacture of records to be able to ascertain at once upon the formation of an original record before the talent employed leaves the laboratory whether the record is sufficiently perfect for commercial purposes.

A number of slots *e* is provided in the periphery of the turn-table D, into which fit the clamps F for securely holding the record in position on the turn-table. These clamps F

comprise a head f , having a knife-edge f' on their inner edges, adapted to take into the material forming the record. The lower portion of the head f is reduced, as at f^2 , and fits in the slotted opening e formed in the turntable, and projecting from the bottom of the head f is a screw-threaded shank f^3 , adapted to receive the nut f^4 for securing the said clamps in their adjusted positions.

Mounted in the side $B B'$, on one side of the central spindle C , is a shaft G , carrying the worm-wheel G' , located centrally between the two side frames. Rigidly secured to the sleeve C' is a worm-wheel H , adapted to mesh with the worm-wheel G' , carried by the shaft G . On the outer projecting end of the shaft G is a gear G^2 , which meshes with an intermediate gear G^3 , journaled on the frame B , which in turn meshes with a gear G^4 , carried on the end of the screw-shaft I . On the lower end of the sleeve C' is rigidly secured the driving-pulley H' , which is connected by means of a suitable belt to the driving mechanism of the machine. This pulley H' also carries a belt h , which is connected to the spindle of a governor J , which may be of any of the ordinary constructions used for this class of machines. On the governor-spindle is a sleeve j , to which is connected one end of the springs which carry the governor-balls, and on the lower end of the sleeve j is formed a disk j' , on the upper surface of which bears a brake-lever j^2 , which is pivoted to the governor-frame. This brake-lever j^2 projects upwardly and has pivotally secured to its outer end a rod k , which is connected with the mechanism of an indicating-dial K , which dial shows during the operation of the machine the number of revolutions of the turntable.

Journaled in the side frames $B B'$ are the horizontal shafts $I I'$. The shaft I' is screw-threaded for a portion of its length, as illustrated in Fig. 2 of the drawings, and is driven by means of the gearing heretofore described. The shaft I' is stationary and carries the supporting-arm L , which is mounted thereon by means of the sleeve l , adapted to fit loosely around the said shaft I . The other end of the supporting-arm L is provided with a slot through which passes the segmental arm M , having on its lower end screw-threads adapted to engage with the screw-threads provided on the shaft I , heretofore described. The set-screw m is provided for holding the segment M in its adjusted position. In the central portion of the supporting-arm L , I provide a longitudinal slot N , through which pass the bolts $n n'$, the said bolts being secured to the spectacle O , which is adapted to hold the sound-box during the recording process and the planing-tool during the planing and truing process. Each of the screws $n n'$ are provided on their upper ends with the hand-nuts $n^2 n^3$.

An adjusting-screw o passes through the center of the slot N' and enters into the opening

o' of the spectacle for the purpose of holding the sound-box in position therein.

In Fig. 3 of the drawings I have illustrated a slight modification, which consists in providing the strips $r r'$ on each side of the screw-shaft I , running parallel therewith, said strips being rigidly secured to the side frames $B B'$. Through the segment M , near the bottom thereof, I provide a pin s , extending there- through, adapted to rest on the top edges of the strips $r r'$ when the segment M is in contact with the screw-shaft I . This construction prevents any sagging of the movable arm L in the event of the screw-threads on the shaft I being irregular.

When it is desired to plane the surface of the record-tablet E before the recording operation, I employ a tool such as illustrated in Figs. 4 and 5 of the drawings, which can be inserted in the opening o' of the spectacle O and secured therein by means of the set-screw o . This tool comprises a holder P , cylindrical in form, having an opening provided transversely through one end thereof for the reception of the cutting-tool p . A set-screw p^2 passes longitudinally through the center of the cylinder P and impinges against the tool p for holding the same in position. The end of the tool p is provided with a diamond-point p' , such as is used in machines of this character.

In operation the record-blank E is placed in position on the turn-table D , being centered by means of the annular shoulder of the centering-disk D' entering a depression formed in the lower side of the said record, and the clamps F are then adjusted so as to tightly clamp the periphery of the record-disk and hold it firmly in position. The recording sound-box, which is not illustrated in this case, but which may be of any of the well-known constructions, is placed in position in the spectacle O and adjusted by means of the set-screw o . When this operation has been completed, the recording-stylus will be in contact with the upper surface of the record-blank, and the motor is now started, which revolves the sleeve C' and the turn-table D and also transmits motion through the medium of the worm-gear $G H$ and the intermeshing gears $G^2 G^3 G^4$ to the screw-shaft I . The segment M having the screw-threaded end, as heretofore described, being in contact with the threaded portion of the shaft I will feed the supporting-arm L , carrying the sound-box toward the center of the record-disk, and the record-grooves will be recorded therein. The sound-box can be easily and readily adjusted with relation to the record-blank by means of the set-screws $n n'$, and as soon as the record has been completed the supporting-arm L can be raised from contact with the screw-shaft I and the sound-box removed. A reproducing sound-box can then be inserted in the spectacle O for the purpose of testing the said record, so as to ascertain

whether it is sufficiently perfect for commercial purposes.

Before the recording operation it will be found necessary to plane off the upper surface of the record, so as to make the same perfectly true and even, and in order to accomplish this the tool-holder P, carrying the planing-tool *p*, can be inserted in the spectacle O and the entire surface of the record planed off, so as to insure of its being perfectly true and level.

While I have illustrated and described the particular form of mechanism now used by me, it is evident that various changes might be made in the construction and arrangement of the different parts without departing from the spirit and scope of my invention. Consequently I do not wish to be limited to this exact construction.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a sound-recording machine, the combination of a rotating table adapted to support a record-tablet, a horizontally-disposed rod journaled in the frame of the machine above the record-table on one side of the center of said table, a screw-threaded shaft journaled in the main frame on the other side of the table center parallel to the first-mentioned rod, a transversely-disposed carrying-arm loosely mounted on the rod so as to slide freely thereon, a half-nut secured adjacent the free end of the said carrying-arm adapted to rest by gravity on the top of the screw-threaded shaft, an adjusting-spectacle adapted to carry a recording sound-box carried by the carrying-arm, and means for adjusting the half-nut to regulate the height of the recorder, substantially as described.

2. In a sound-recording machine the combination of a rotary table adapted to support a record-tablet, a horizontally-disposed rod journaled in the machine-frame above the table on one side of its center, a screw-threaded shaft journaled in the frame on the other side of the table center, means for revolving said screw-threaded shaft, a carrying-arm loosely mounted on the first-mentioned rod so as to slide freely thereon, a threaded half-nut secured to the other end of said carrying-arm adapted to rest upon and engage the screw-threaded shaft, means for adjusting the half-nut vertically to raise or lower this end of the carrying-arm, a spectacle carried by the carrying-arm adapted to support a sound-box or other recording instrument and means for adjusting the said spectacle on the carrier, substantially as described.

3. The combination with a revolving turn-table, of a supporting arm or carriage arranged above said turn-table, means for moving said carriage in a line parallel to a radius of the table, a spectacle carried by the carriage adapted to support a sound-box, means for adjusting the said spectacle laterally on the carriage, and means for the vertical adjustment of said spectacle, for the purpose described.

4. In a sound-recording machine, the combination of a tapering spindle rigidly supported in the frame of the machine, ball-bearings supported in a race formed on the lower end of said spindle, a loose sleeve fitting around the spindle and supported on the ball-bearings carried thereby, a turn-table secured to the upper end of said sleeve, a worm-wheel secured on the said sleeve below the turn-table, a spiral gear mounted on a horizontally-disposed shaft adapted to engage with the worm-gear, a sliding carriage supported above the turn-table, a screw-threaded shaft for feeding the said sliding carriage, gearing connecting the screw-threaded shaft with the spiral-gear shaft and means for driving the vertical sleeve and turn-table, substantially as described.

5. The combination with the revolving turn-table of a supporting arm or carriage arranged above said table, means for moving the said carriage in a line parallel to a radius of the table, a slotted opening formed in the center of the carriage, a spectacle located on the under side of the carriage, set-screws secured to said spectacle adapted to pass through the slotted opening, and hand-nuts provided on the upper ends of the set-screws for adjusting the position of the spectacle, substantially as described.

6. The combination with the revolving turn-table, of a supporting arm or carriage loosely mounted at one end on a horizontal shaft arranged above the turn-table, a shaft, I, arranged parallel to the main shaft, means for revolving said screw-shaft, a pair of parallel bars arranged on each side of the screw-shaft, a half-nut carried by the carriage adapted to rest upon the screw-threaded shaft, and a pin passing through said half-nut adapted to rest at each end upon the parallel bars, substantially as described.

In witness whereof I have hereunto set my hand this 18th day of January, A. D. 1900.

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,
BENJ. F. PERKINS.

741 500

No. 741,501.

PATENTED OCT. 13, 1903.

E. R. JOHNSON.
BRAKE FOR TALKING MACHINE MOTORS.
APPLICATION FILED MAY 13, 1902.

NO MODEL.

Fig. 1.

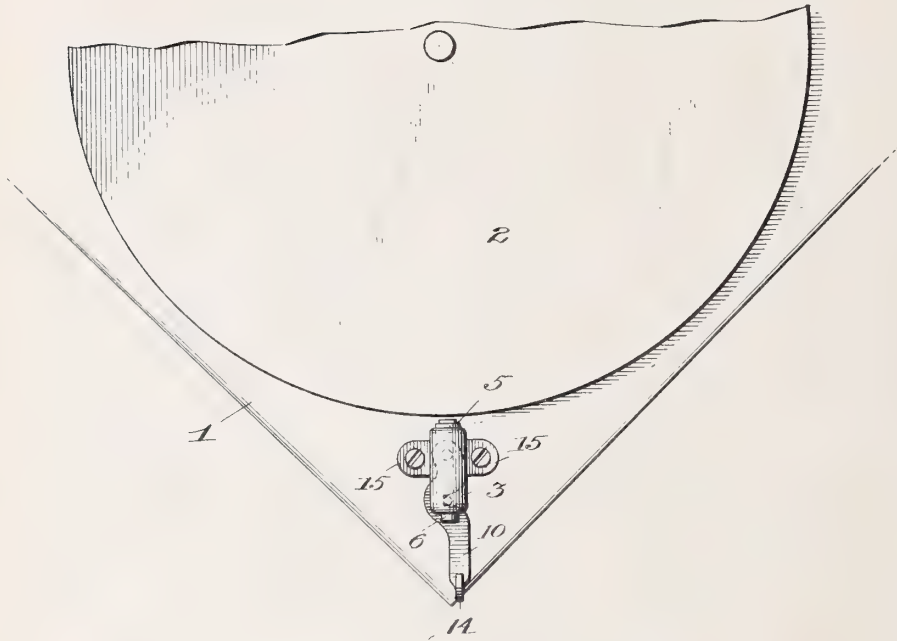


Fig. 2.

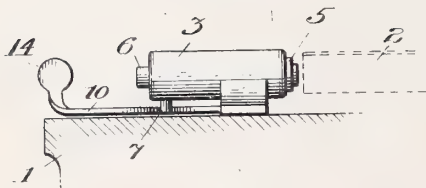


Fig. 3.

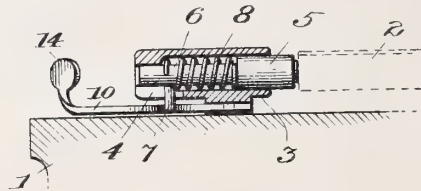
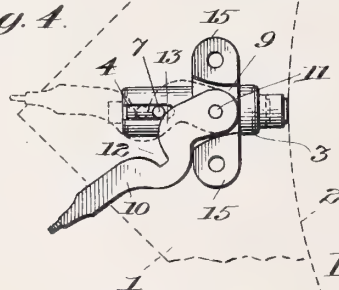


Fig. 4.



WITNESSES:

Jno. F. Cross.
Chas. Bennett.

INVENTOR:

Eldridge R. Johnson,

by Horace Pettit

ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

BRAKE FOR TALKING-MACHINE MOTORS.

SPECIFICATION forming part of Letters Patent No. 741,501, dated October 13, 1903.

Application filed May 13, 1902. Serial No. 107,128. No model.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Brakes for Talking-Machine Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an improved brake, and is particularly adapted to revolving tables or record-supports, such as are used on talking-machines.

The object of my invention is to provide a simple and effective brake adapted to bear against the peripheral edge of a turn-table or other record-support of a talking-machine with a slight yielding pressure, so that in the braking operation it may adapt itself to any untrueness which may exist in the said table or support, and, further, in providing an improved mechanism for actuating the said brake and effectively stopping the revolutions of the record-support.

With these objects in view my invention consists in the construction and arrangement, such as hereinafter fully described, and particularly pointed out in the claims made hereto.

Referring to the accompanying drawings, Figure 1 is a plan view illustrating a portion of a talking-machine showing my improved brake applied thereto. Fig. 2 is a side elevation, the brake-bolt being shown as out of contact with the record-supporting table. Fig. 3 is a sectional elevation, the brake-bolt being shown as bearing against the record-supporting table. Fig. 4 is a bottom plan view showing the cam-lever for actuating the brake-bolt in the position it assumes when said bolt is in contact with the supporting-table, the dotted lines showing the position of the cam-lever when said bolt is withdrawn from the supporting-table.

Referring particularly to the said drawings, 1 designates the casing, which incloses the motor-mechanism of the ordinary type of disk talking-machine, and 2 is a turn-table, which

is mounted in the usual manner on the driving-spindle of the motor.

The brake comprises a hollow tubular sleeve, as 3, made of any suitable material, having projecting ears 15 on each side thereof, by means of which it is secured to casing of the machine. The inner bore of the sleeve 3 is slightly reduced in diameter at a point near its outer end, as illustrated in Fig. 3, and extending on the lower side of the sleeve is a longitudinal slot 4, which enters into the said bore. A brake-bolt 5, having a reduced portion 6, is adapted to the interior of the sleeve 3 and is provided with a pin 7, located adjacent its outer end, which extends through the longitudinal slot 4 and projects a short distance below the outer surface of the sleeve. A coiled spring 8 surrounds the reduced portion of the bolt, bearing at one end against the shoulder formed by the larger portion 5 and at its other end against a shoulder formed by the reduced diameter of the sleeve-bore. The under side of the sleeve between the two ears 15 is recessed, as at 9, to provide a bearing for the cam-lever 10, which is pivoted, through the medium of the pin 11, to the said sleeve 3. This cam-lever is provided on one edge with a recess 12 and the cam-surface 13 on one side of said recess, which bears against the pin 7, carried by the brake-bolt 5. On the end of the cam-lever 10 is an upwardly extending projection 14, which serves as a thumb-piece or handle for operating the cam-lever.

When the brake-bolt is withdrawn from contact with the turn-table, the cam-lever assumes the position shown in Fig. 1 and in dotted lines in Fig. 4, and the pin 7 is held in the recess 12 of said lever, which holds the bolt out of contact and causes the spring 8 to be compressed within the bore of the sleeve 3. As soon as the lever 10 is moved to one side the spring 8 will cause the brake-bolt to move inwardly and brake against the periphery of the turn-table with a slightly-yielding pressure and immediately stop the revolution of the said table. The walls of the recess 9 limit the movement of the lever 10. It will be seen that the cam-surface 13, which bears

against the pin 7, operates to push the said pin outwardly, and thereby withdraw the said bolt from contact with the turn-table and at the same time compress the spring within the bore of the sleeve 3, and when the said lever has been moved until the pin 7 rests in the recess 12 the said lever will be held in this position by the pressure of the spring exerted on the same through the medium of the pin 7.

While I have shown and described my improved brake as being applied to the periphery of a record-supporting table in talking-machines, it is evident that the same might be applied to the under side of the table without changing the principle of my invention. Such a construction would, however, necessitate the securing of the brake in a vertical position instead of a horizontal, which could be easily accomplished.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a brake for talking-machines, the combination with a turn-table, a casing, a plunger substantially inclosed by said casing, a coiled spring carried by said plunger and adapted to force the same against the turn-table, a projection carried by said plunger, and a notched lever pivoted to said casing, the notch forming a cam adapted to con-

tact with said projection to withdraw said plunger.

2. A brake for talking-machines, comprising in combination with the turn-table, a tubular casing, a plunger, a coiled spring surrounding said plunger and adapted to force the same against the turn-table, a pin carried by said plunger, and a notched lever pivoted to said casing, the notch forming a cam adapted to contact with said pin to withdraw said plunger.

3. A brake for talking-machines comprising in combination with the turn-table a tubular casing, a plunger having a reduced portion within said casing, a coiled spring surrounding said reduced portion and adapted to force said plunger against the turn-table, a pin carried by said plunger adapted to reciprocate in a slot in said casing and a substantially straight notched lever pivoted to said casing, the notch forming a cam adapted to contact with said pin to withdraw said plunger.

In witness whereof I have hereunto set my hand this 8th day of April, A. D. 1902.

ELDRIDGE R. JOHNSON.

Witnesses:

ALBERT C. MIDDLETON,
JNO. T. CROSS.

741,543.

No. 741,543

PATENTED OCT. 13, 1903.

M. A. POSSONS.
TALKING MACHINE.

APPLICATION FILED MAY 19, 1902.

NO MODEL.

Fig. 1.

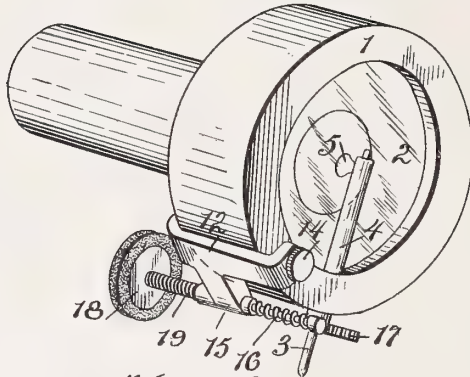


Fig. 2.

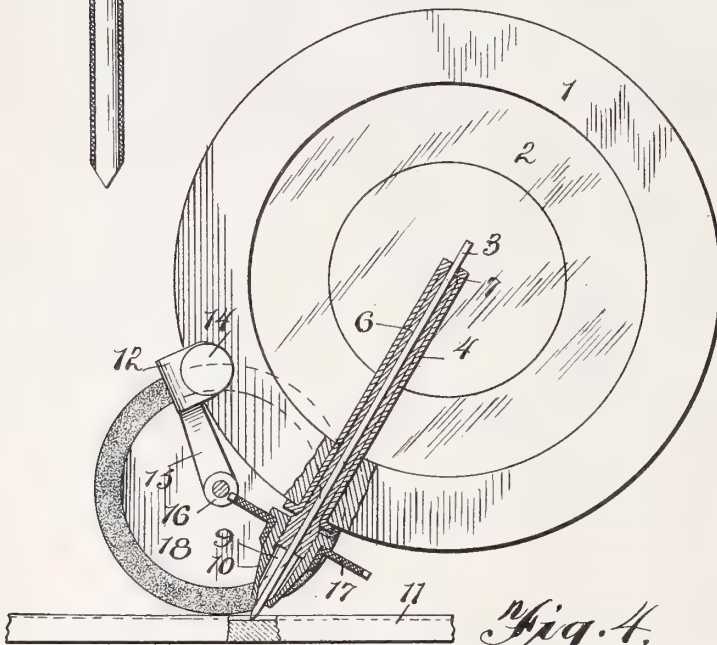


Fig. 4.

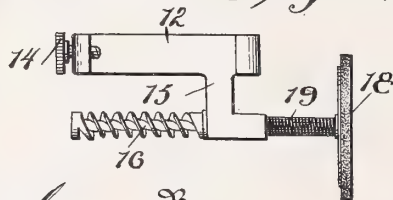
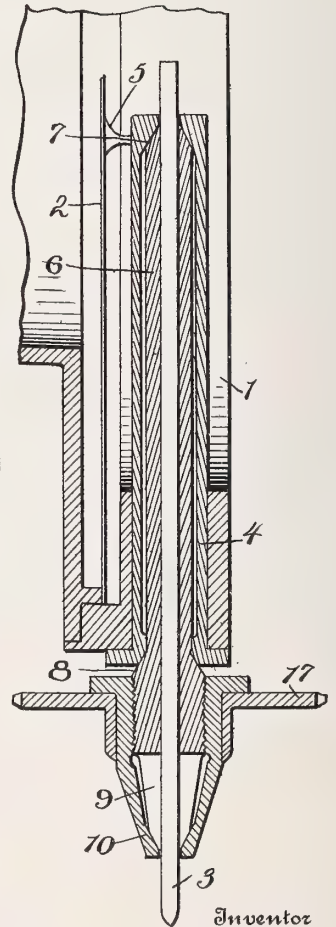


Fig. 3.



Inventor

Witnesses

Geo. E. Trech
E. R. Wright Jr.

By

Minard A. Possons,
A. J. Pattison,
Attorney.

UNITED STATES PATENT OFFICE.

MINARD A. POSSONS, OF CLEVELAND, OHIO.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 741,543, dated October 13, 1903.

Application filed May 19, 1902. Serial No. 108,078. (No model.)

To all whom it may concern:

Be it known that I, MINARD A. POSSONS, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates to improvements in talking-machines, and pertains especially to that class of machines in which a disk record is used and a metallic needle. As is well known by those skilled in this art and by users of this class of talking-machines, the needle is so cut and worn in the use thereof that it becomes useless for good results after playing one tune, and it is necessary to provide a new needle.

My invention pertains to means for automatically retaining the point of the needle, whereby the needle is adapted for continuous use until worn out.

The means whereby I prevent the wearing of the point of the needle upon one side, which makes it unfit for playing more than one tune, and whereby I cause the needle to wear uniformly at its point consists in providing any suitable means for causing a rotation of the needle.

As is well understood by those skilled in this art, the needle in this class of machines is inclined about sixty degrees. The angle of the needle therefore regulates the angle of the point when the needle is caused to rotate according to my present invention, thus causing the point of the needle to be at the angle at which it is inclined and adapted for continuous use until completely worn out.

My present invention also pertains to means for longitudinally adjusting the needle as its point is worn away, whereby a single needle is adapted for long service, since I find that one thirty-second of an inch of this needle will play about one hundred tunes. My invention therefore makes it possible for this class of talking-machines to be controlled by coin-actuated mechanism, which, so far as I am aware, has not been heretofore possible on account of the necessity of changing the needle after a single operation thereof.

In the accompanying drawings I have shown one specific manner of accomplishing the rotation of the needle, though I do not limit

myself to any particular construction or mechanism or manner of causing the needle to rotate, my invention being, broadly, the idea of a rotatable needle, whereby it is caused to automatically wear all sides of its point uniformly and adapting it for continuous use, which is not possible in the use of the ordinary stationary needle.

Referring now to the drawings, Figure 1 is a perspective view of the sound-box, showing one form or adaptation of my revoluble needle in connection therewith. Fig. 2 is an enlarged front view of the sound-box, showing the needle-support in longitudinal sectional view. Fig. 3 is an enlarged sectional view taken longitudinally through the needle-support at the lower portion of the sound-box. Fig. 4 is a detached view of the clamp which carries a part of the particular specific form of mechanism here shown for causing the rotation of the needle. Fig. 5 is an enlarged longitudinal sectional view of the needle, showing its specific construction.

In the accompanying drawings like reference-numerals designate corresponding parts in the several figures.

1 indicates the casing of the sound-box, 2 the diaphragm, and 3 the needle.

In the usual construction of talking-machines of this class the needle is stationary and is stationarily connected with the diaphragm in any suitable manner.

My improvement, as before stated, consists in providing any suitable means for causing the rotation of the needle. As here shown, one specific form for accomplishing this consists in providing a supporting tube or member 4, which is connected in the usual manner through the means of a connection 5 at its inner end with the diaphragm 2. The outer end of the supporting member or tube passes through the flange of the sound-box. Situated within the supporting member or tube 4 and revoluble in relation thereto is a needle-holder 6. This needle-holder consists of a tube having its end provided with conical bearing portions 7 and 8, adapted to coact with corresponding recesses in opposite ends of the tube, whereby lost motion between the needle-holder and its supporting member or tube 4 when the machine is in use is prevented. The lower and outer end of

the needle-holder projects and is provided with a screw-threaded jaw portion 9, adapted to receive an ordinary clamping-chuck 10, by means of which the needle 3 is clamped at the desired point within the holder and adapted to be adjusted longitudinally therein as it becomes worn until it is too short for further use. From this construction it will be noted that the needle-holder is movable from its supporting member or tube 4, but will be held in position therein in the use of the machine, since the projecting end of the needle is in contact with the record 11.

The needle-holder will be rotated through the medium of any suitable means, and I do not limit myself to the manner of causing the rotation of the needle or to the manner of supporting the needle whereby it is adapted to be rotated. The means here shown for causing the rotation of the needle is actuated through its contact with the record, though other means of actuating the needle may be provided without departing from the spirit and scope of my invention.

Referring now particularly to one of the specific forms for causing the rotation of the needle, as here illustrated; 17 is a cog-gear constructed of non-metallic material and which is suitably connected with the chuck 10, and this cog-wheel is in engagement with a worm 16, carried by a shaft suitably journaled in an arm 15 of a bracket 12. The bracket 12 is clamped to the sound-box by means of a thumb-screw 14, though it will be readily understood that the supporting member for the worm 16 may be integral with the sound-box. The opposite end of the shaft, which carries the worm 16, has attached thereto a non-metallic actuating-wheel 18. The periphery of this wheel 18 is preferably composed of felt and is in contact with the record 11 and is caused to rotate and in turn causes the rotation of the worm, and the worm in turn causes a rotation of the needle through the medium of the gear 17, as will be readily understood. The connecting member 19 between the non-metallic actuating-wheel 18 and the shaft of the worm 16 is flexible, and preferably, as here shown, consists of a spiral-wire tube which permits ready flexibility and yet will transmit its rotary motion to the shaft of the worm 16 and through the medium of the shaft to the worm for causing the rotation of the needle, as before explained. This form of flexible connection will not affect the vibration of the needle for vibrating the diaphragm in the sound-box, yet it will cause a rotation of the needle through the frictional contact of the felt periphery with the record 11, which is rotated thereunder.

By reference to Fig. 5, which shows a sectional view of the needle, 20 indicates a soft material for the purpose of preventing the breaking of the needle under the constant vibration of its use.

So far as I am aware I am the first one to produce a rotatable needle for talking-ma-

chines, and I therefore do not limit myself to any particular manner or means whereby the needle is caused to rotate.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a talking-machine, a diaphragm and a longitudinally-extended inclined reproducing-needle freely rotatable about its own axis and phonetically connected with the diaphragm.

2. In a talking-machine, a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis, means actuated by contact with the record, and an operative connection between said means and the needle for revolving the latter.

3. In a talking-machine, a diaphragm, a record, and a longitudinally-extended reproducing-needle freely rotatable about its own axis and longitudinally adjustable, said needle being in phonetic connection with the diaphragm.

4. In a talking-machine, a diaphragm, a record, a longitudinally-extended reproducing-needle holder freely rotatable about its own axis phonetically connected with said diaphragm, and a reproducing-needle held by and longitudinally adjustable within the holder.

5. In a talking-machine, a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis, a wheel rotated by contact with the record, and an operative connection between the wheel and the needle for rotating the latter.

6. In a talking-machine, a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis, a shaft carrying a wheel rotated by contact with the record, and an operative connection between said shaft and said reproducing-needle for rotating the latter.

7. In a talking-machine, a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis, a shaft carrying a wheel which is rotated by contact with the said record, a shaft operatively connected with said needle to rotate it, and a flexible connection between said needle and said shaft.

8. A talking-machine including a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis and phonetically connected with said diaphragm, and a non-metallic actuating-wheel adapted to rotate by contact with the record, said wheel operatively connected with the needle to cause the rotation thereof.

9. A talking-machine including a diaphragm, a record, a longitudinally-extended reproducing-needle freely rotatable about its own axis and phonetically connected with the diaphragm, a gear connected with said needle, a shaft extending at right angles to said wheel and carrying a worm in engagement with the gear, and a wheel flexibly connected

with the shaft and adapted to be rotated by contact with the record.

5 10. A talking-machine including a record, a diaphragm, a longitudinally-extended needle-holder phonetically connected with the diaphragm, and rotatable about its own axis, a reproducing-needle carried by said holder, a supporting member, the supporting member and the needle-holder having conical
10 bearings, and means for rotating said needle-holder.

11. A talking-machine including a diaphragm, a longitudinally-extended reproducing-needle rotatable about its own axis and
15 phonetically connected with the diaphragm, and a detachable bracket carrying means for causing the rotation of the needle.

12. In a talking-machine, the combination
20 of a longitudinally-extended reproducing-needle rotatable about its own axis and auto-

matically sharpened and means for rotating the said needle.

13. In a talking-machine, the combination of a record of sound, a pointed needle freely rotatable about its own axis, and means for
25 rotating the needle while it is in contact with the record.

14. A stylus for sound-reproducing machines, comprising a longitudinally-extended reproducing-needle, journaled in the stylus-
30 lever of a sound-box and free to turn about its own axis as it traverses the record, and means for turning the needle.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
35 witnesses.

MINARD A. POSSONS.

Witnesses:

LYMAN A. REED,
Z. DAVIS.

741, 543.

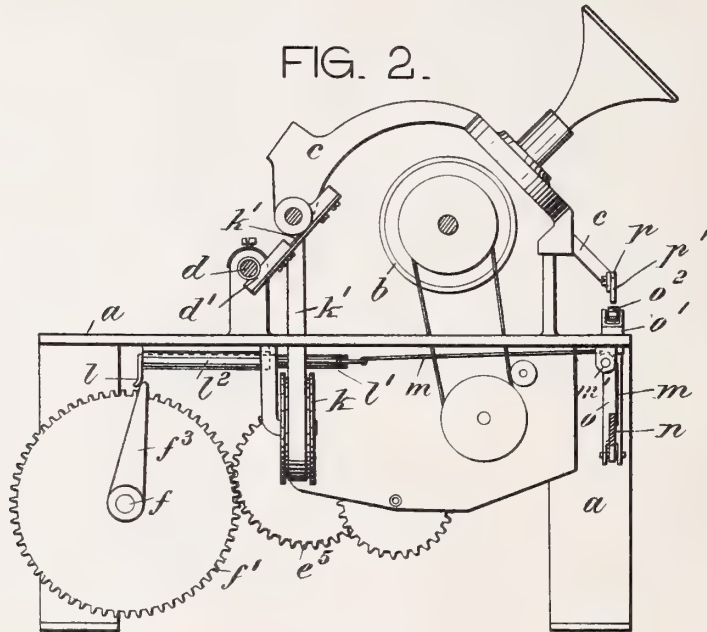
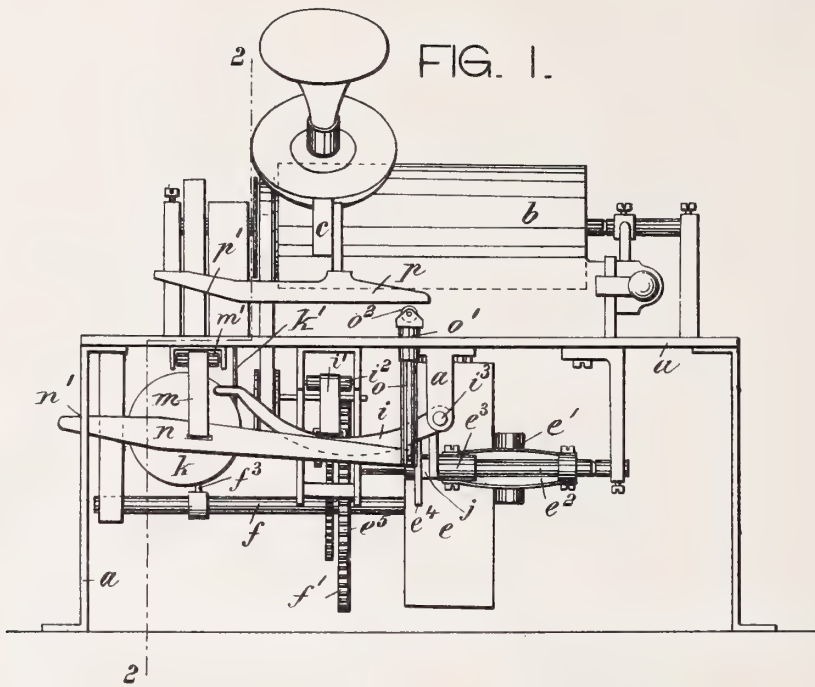
C. C. REINHARDT.

ACTUATING MECHANISM FOR PHONOGRAPHS OR SIMILAR EXHIBITORS.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:
Arthur J. Jumper
Edmund R. Ray

Inventor:
Charles C. Reinhardt
by his attorney
A. B. Bissell

742,233

No. 742,233.

PATENTED OCT. 27, 1903.

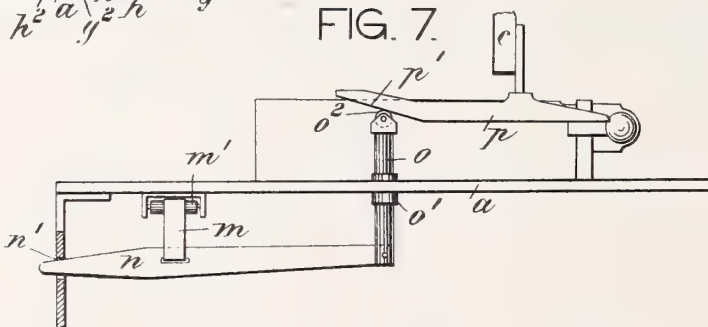
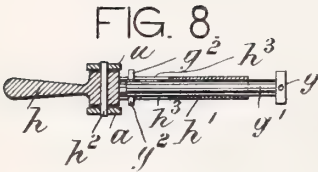
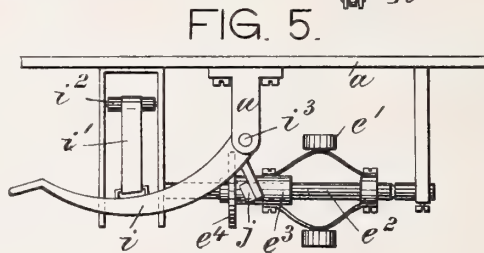
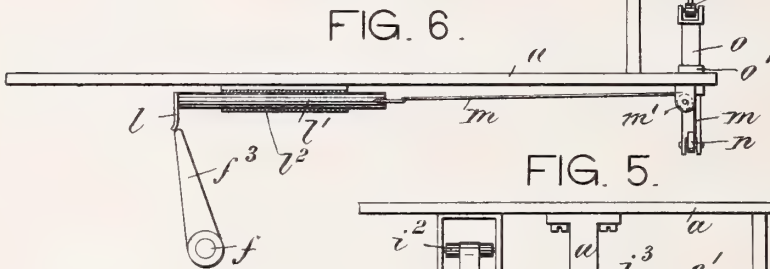
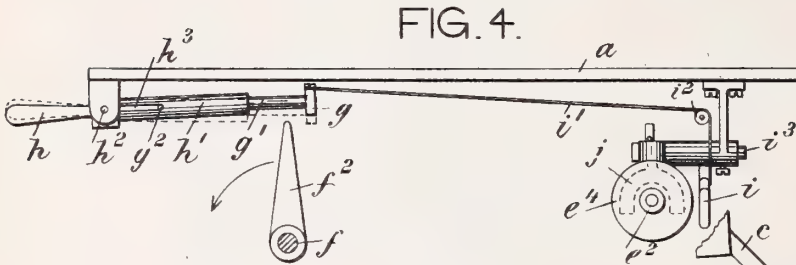
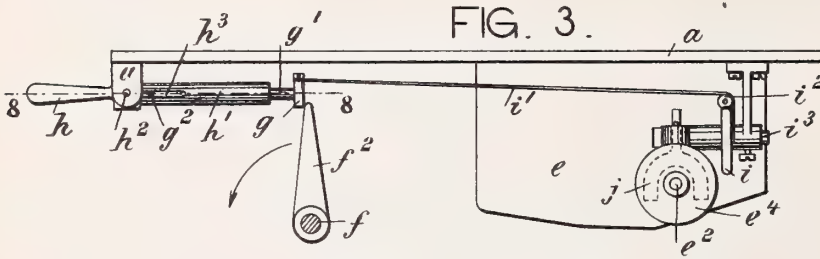
C. C. REINHARDT.

ACTUATING MECHANISM FOR PHONOGRAPHS OR SIMILAR EXHIBITORS.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:
Allen J. ...
Edward Ray

Inventor:
Charles C. Reinhardt
 by his attorney
Frankot & Sorenson

UNITED STATES PATENT OFFICE.

CHARLES C. REINHARDT, OF NEW YORK, N. Y.

ACTUATING MECHANISM FOR PHONOGRAPHS OR SIMILAR EXHIBITORS.

SPECIFICATION forming part of Letters Patent No. 742,233, dated October 27, 1903.

Application filed March 25, 1903. Serial No. 149,433. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. REINHARDT, a citizen of the United States, residing at New York city, (Manhattan,) county and State of New York, have invented certain new and useful Improvements in Actuating Mechanism for Phonographs or Similar Exhibitors, of which the following is a specification.

This invention relates to improved means for starting and resetting a phonograph or similar exhibitor in a simple and reliable manner.

In the accompanying drawings, Figure 1 is a front elevation of a phonograph embodying my invention; Fig. 2, a cross-section on line 2 2, Fig. 1, showing the parts in a different position. Figs. 3 and 4 are details of the starting mechanism, showing the parts in different positions. Fig. 5 is a detail of the governor and brake; Fig. 6, an end view of the resetting mechanism; Fig. 7, a front elevation thereof; and Fig. 8 a section on line 8 8, Fig. 3.

The letter *a* represents the frame of a phonograph, *b* is the record-cylinder, and *c* the carriage, carrying the reproducer and engaging a worm *d* by a screw-block *d'*, all as usual. The cylinder as well as the worm are rotated by a suitable spring or electric motor *e*, influenced by a centrifugal governor *e'*. This governor is mounted upon a shaft *e²* and has a slidable member *e³*, which carries a brake-disk *e⁴*. A time-shaft *f* is by wheels *f'* *e⁵* intergeared with the motor in such a manner that the shaft *f* makes one full rotation during each complete reciprocating movement of the carriage *c*. Upon the shaft *f* are mounted two radial fingers *f²* *f³*, of which the finger *f²* is set largely in advance of finger *f³*. The finger *f²* normally engages the inner side of the slide *g*, Fig. 3, which is mounted upon a stem *g'*. This stem is telescoped by the tubular sleeve *h'* of a lever *h*, fulcrumed to frame *a* at *h²* and operated in any suitable manner. Pins *g²* on stem *g'*, engaging slots *h³* of sleeve *h'*, limit the movement of the stem *g'* within the sleeve. The slide *g* is connected by a string or tape *i'*, passing over idler *i²*, to a lever *i*, fulcrumed to frame *a* at *i³*, Fig. 5. This lever carries a bifurcated

brake-shoe *j*, which straddles the member *e³* of governor *e'* and is adapted to frictionally engage the brake-disk *e⁴*.

The operation as thus far described is as follows: Normally the finger *f²* being under the influence of the motor, pushes the slide *g* outward, and the latter by string *i'* raises the lever *i*, so as to hold the brake-shoe *j* in frictional contact with the disk *e⁴*, and thus arrest the motor, Figs. 1 and 3. By depressing lever *h* the slide *g* is raised to clear finger *f²*, Fig. 4, and liberate the lever *i*. This lever now descending by gravity will move the slide *g* across the end of finger *f²* and will simultaneously take the brake *j* off disk *e⁴*, Fig. 5, and thus release the governor, so that the motor is started. The finger *f²* being clear of the slide *g*, permits the time-shaft *f* to make one full rotation, upon the completion of which the finger rearrests the motor in manner hereinafter described. It will be seen that the sliding connection between actuating-lever *h* and slide *g* permits the latter to be rapidly drawn across the finger *f²* by the weight of lever *i* as soon as the lever *h* is depressed. This gives the motor ample time to start and prevents the slide from falling against the same side of finger *f²* upon a quick release of lever *h*. The released motor will rotate the cylinder *b* and worm *d* and will carry the carriage *c* along the worm and cylinder in the usual manner. During this forward movement of the carriage it will wind up by a string or tape *k'* a coiled return-spring contained in drum *k*. After the reproducer has reached the end of the race it is automatically returned to its initial position in the following manner: The second finger *f³* of time-shaft *f* is adapted to bear against a slide *l*, mounted upon stem *l'*, which is movable within a tubular guide *l²*. The stem *l'* of slide *l* is connected by a string or tape *m*, passing over idler *m'*, to a lever *n*, fulcrumed to frame *a* at *n'*, Figs. 1 and 7. The end of lever *n* carries a vertical lifter *o*, guided in a bearing *o'* and provided at its upper end with a friction-roller *o²*. This roller is arranged beneath a rail *p*, connected to carriage *c*, parallel to the worm *d* and having an inclined left-hand lower edge *p'*.

When the reproduction of the record on cylinder *b* is finished, the finger *f*³ will by bearing against the inner end of slide *l*, Fig. 2, move the same outward, Fig. 6. The slide 5 will by string *m* raise lever *n* to elevate the lifter *o*. The roller *o*³ of the lifter will thus be brought into engagement with the lower edge of rail *p* and by raising the latter will tilt the carriage *c* backward and disengage 10 the screw-block *d'* from worm *d*. The carriage being liberated, will be rapidly returned to its initial position by tape *k'* and the return-spring in drum *k*. During the beginning of this return motion the roller *o*³ will 15 by engaging the inclined edge *p'* of rail *p*, Fig. 7, give an additional backward tilt to the carriage to more rapidly release the worm from the screw-block. After the carriage has returned to its original position the finger *f*³ will clear the slide *l* to release lever *n* and permit the lifter *o* and carriage *c* to descend by gravity. The finger *f*² will now have swung around to such a position as to engage the opposite side of slide *g* and push 25 the same outward, Fig. 3. This movement of slide *g* will elevate lever *i* by string *v'* and reset the brake-shoe *j* against the disk *e*⁴, so as to arrest the motor. The parts are now in position for a new exhibition effected by a 30 new depression of lever *h*.

The improved releasing and resetting mechanism herein described may be used on moving exhibitors other than phonographs whenever a power-controlled carriage or shaft is 35 to be liberated or returned.

What I claim is—

1. In an apparatus of the character described, a power-controlled time-shaft having a pair of fingers, combined with a carriage, 40 means controlled by one finger to advance the carriage, and means controlled by the second finger to return the carriage, substantially as specified.

2. In an apparatus of the character described, a power-controlled time-shaft having a pair of fingers, combined with a movable spring-influenced carriage, a motor for actuating the same, a governor controlling the motor, a brake controlling the governor, means 50 controlled by the first finger for setting the brake, and means controlled by the second

finger for returning the carriage, substantially as specified.

3. In an apparatus of the character described, the combination of an actuating-lever 55 with a slide movably connected thereto, a time-shaft having a finger that engages the slide, a brake operatively connected to the slide, a motor having a governor controlled by the brake, and a carriage actuated by the 60 motor, substantially as specified.

4. In an apparatus of the character described, the combination of an actuating tubular lever with a slide having a stem which is telescoped by the lever, a time-shaft 65 having a finger that engages the slide, a lever connected to the slide, a brake connected to the lever, a motor having a governor controlled by the brake, and a carriage actuated by the motor, substantially as specified. 70

5. In an apparatus of the character described, the combination of a time-shaft having a finger, with a carriage, a rail on the carriage, and a lifter actuated by the finger and adapted to engage the rail, substantially as 75 specified.

6. In an apparatus of the character described, the combination of a time-shaft having a finger, with a carriage, a rail on the carriage having an inclined lower edge, and a 80 lifter actuated by the finger and adapted to engage the rail, substantially as specified.

7. In an apparatus of the character described, the combination of a time-shaft having a finger, with a slide engaging the same, 85 a lever operatively connected to the slide, a lifter actuated by the lever, a carriage, and a rail on the carriage adapted to be engaged by the lifter, substantially as specified.

8. In an apparatus of the character described, the combination of an actuating-lever 90 with a slide movably connected thereto, a tape connected to the slide, a brake-controlling lever connected to the tape, and a time-shaft having a finger that engages the slide, 95 substantially as specified.

Signed by me at New York city, (Manhattan,) New York, this 24th day of March, 1903.

CHARLES C. REINHARDT.

Witnesses:

WILLIAM SCHULZ,
F. V. BRIESEN.

No. 742,454.

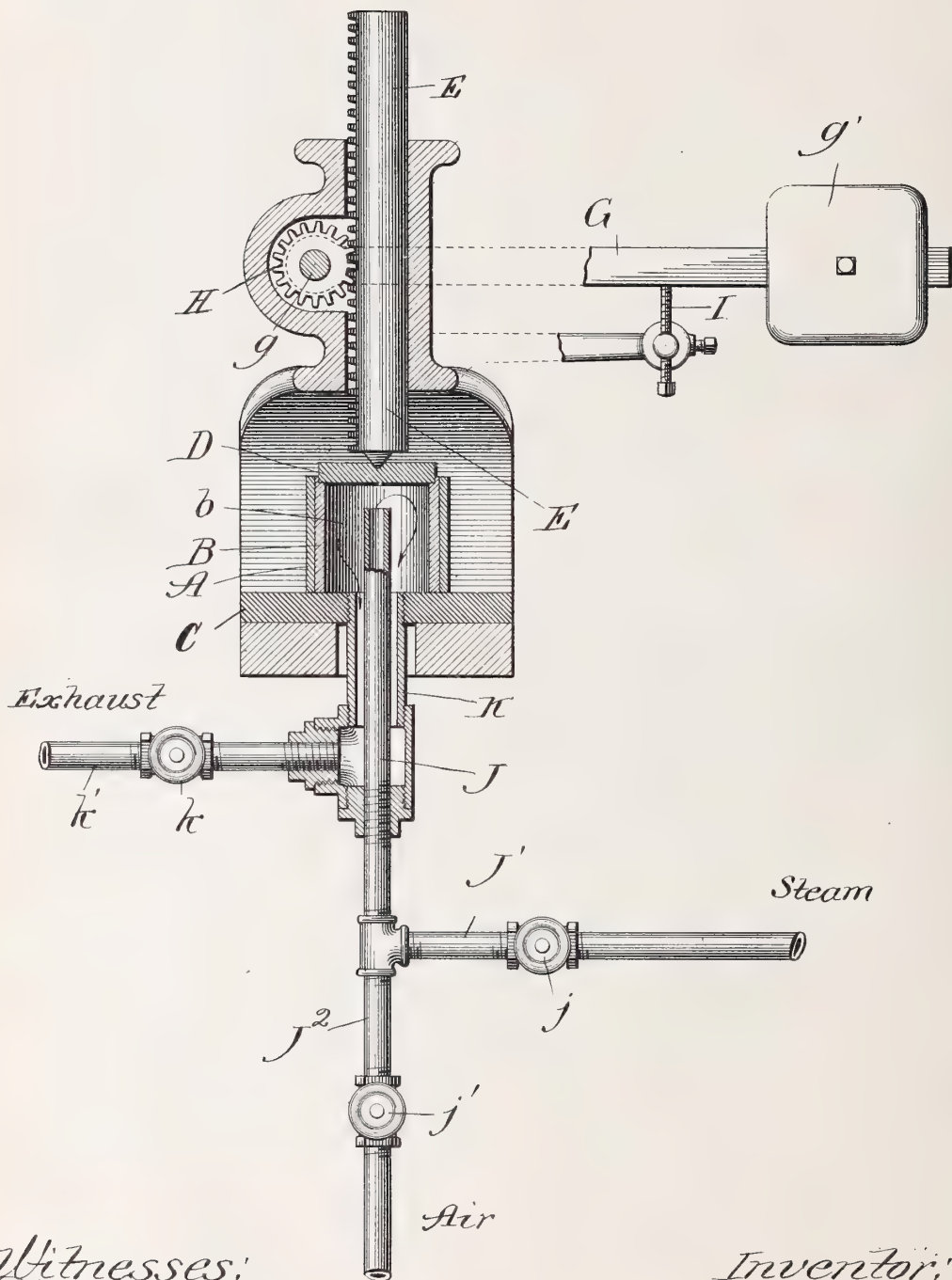
PATENTED OCT. 27, 1903.

T. B. LAMBERT.

PROCESS OF REPRODUCING PHONOGRAPHIC RECORDS.

APPLICATION FILED JUNE 14, 1900.

NO MODEL.



Witnesses:
Carl Gaylord,
John Enders, Jr.

Inventor:
Thomas B. Lambert,
By Thomas F. Sheridan
Attorney

UNITED STATES PATENT OFFICE.

THOMAS B. LAMBERT, OF CHICAGO, ILLINOIS, ASSIGNOR TO LAMBERT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PROCESS OF REPRODUCING PHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 742,454, dated October 27, 1903.

Application filed June 14, 1900. Serial No. 20,249. (No specimens.)

To all whom it may concern:

Be it known that I, THOMAS B. LAMBERT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Producing Duplicate Phonographic Records, of which the following is a specification.

This invention relates particularly to processes by which the ordinary record now used in connection with phonographs may be copied or duplicated any number of times, and especially to the production of indestructible duplicate-records, all of which will more fully hereinafter appear.

The principal object of the invention is to provide a simple, economical, and efficient process of reproducing phonographic records; and the invention consists in the process hereinafter described and claimed.

The accompanying drawing represents a vertical sectional elevation of one style of apparatus in which my improved process may be carried out.

In carrying out my process I provide a matrix A of the desired size, shape, and strength and which is preferably cylindrical in contour and formed of copper which has been electrochemically deposited upon a wax cylinder in the manner shown and described in Patent No. 645,920, issued to me on the 20th day of March, 1900, and which it is therefore unnecessary to show and describe in detail here. The inner side of this copper matrix is provided, as is shown in the above-named patent, with a negative of a record-cylinder provided with a surface having indentations which correspond with the projecting portions of the record and projections which correspond with the indentations on the record-cylinder, and in order to make duplicate records I place within such matrix a blank record-cylinder B, formed of celluloid or similar substance—in fact, it can be formed of any substance which is susceptible of being softened by heat and rehardened by cooling. This blank record-cylinder, which may be made of celluloid or other desirable material, is, as above stated, placed within the matrix, so that the record and matrix both rest upon

a base C, which acts as a closure for one end of the chamber inside the record and which I will hereinafter term the "record-chamber" b. A head portion D is next placed upon the record-cylinder to complete the closing of the record-chamber. An air-tight chamber, which I will designate as the "record-chamber," is thus formed within the blank record-cylinder and between the movable head D and the base C. This movable head should be of such diameter as to leave an opening between it and the matrix when the head is in contact with the record-cylinder at a point within or near the matrix, and the opening should be narrower than the thickness of the record-cylinder. The opening will then be closed and sealed by the record-cylinder when pressure sufficient to expand it is applied within, and, as will be readily seen, this opening affords an outlet for the air to escape between the head and matrix and from between the record-cylinder and matrix. This arrangement of the head and matrix leaves the matrix to rest loosely upon the base without anything to hold it unyieldingly against the base. The natural irregularities of the adjacent surfaces of the matrix and base thus afford a sufficient opening between the lower end of the matrix and base to permit air to escape from between the record-cylinder and matrix. In fact, in the absence of anything to hold the matrix rigidly and unyieldingly against the base—such, for instance, as a head in unyielding contact with the opposite end of the matrix—the application of the pressure within the record will force the air from between the record-cylinder and base however regular their adjacent surfaces may be. The natural irregularities of the adjacent surfaces, however, insure a sufficient vent when the relation of the head and matrix is as described, and a gear-spindle E is allowed to drop down thereon. A weighted lever G is provided and mounted upon the shaft g, which carries a pinion H, meshing with the rack e, which in turn operates the spindle above named, and in connection with a stop-screw I determines the position and the amount of pressure with which this spindle may rest on the head.

It is now desirable to soften the record-cylinder so that it may be expanded out against the indented record-surface of the matrix and expand the record-cylinder. In order to accomplish this, steam under about thirty pounds pressure to the square inch is forced into the record-chamber through a supply-pipe J, which is connected, by means of a branch pipe J', with a suitable source of steam-supply. The steam is permitted to escape again out through an exhaust-pipe K, connected with the outer air by means of the branch K'. The steam is kept at a substantially uniform pressure within the record-cylinder chamber, so as to by means of its heat and other actions soften the record and force it out against the inner indented surface of the matrix. After this has been accomplished—and experience teaches the operator just how long under certain pressure it takes the steam to accomplish this result—the steam-supply is shut off by means of the valve *j* and a supply of cool air under pressure is permitted to enter through the supply-pipe J by opening the valve *j'* on a second branch pipe J², which connects with a source of air under pressure and keeps up practically the same pressure as heretofore, but leaves the valve *k* on the exhaust-pipe open, so that all moisture and steam is blown out of the record-chamber, as above described. When the steam has been blown out, the next step is to shut the valve *k* and permit air under the desired pressure to stay in the record-chamber until such blank record is substantially forced into all the indentations made by the record on the inner surface of the copper matrix. As soon as this has been accomplished the air-supply is shut off, leaving just enough air inside the record-chamber to cool the same, and the exhaust-valve *k* is opened sufficiently to permit the air to blow through under certain pressure, and thus assist materially in cooling the record-cylinder.

When the duplication of the record-cylinder has been completed, the spindle E is raised, the head D removed, and the matrix, with its duplicated record, removed from contact with the apparatus. The cooling of the record-cylinder also shrinks it, so that it can be easily removed from engagement with the matrix.

Whenever desirable or necessary, the outer periphery of the matrix may be backed by plaster-of-paris, having a lead or other metallic confining-ring to give it sufficient rigidity to secure the duplication or reproduction of the records, and this is very clearly shown and described in the patent above referred to.

I claim—

1. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the record-surface of an indented matrix, then forcing a supply of heated fluid under pressure

against the exposed surface of the record-blank until such record has been softened and forced into the indentations of the matrix, and then furnishing a supply of cool fluid under pressure to complete the production of the record, and finally removing the record-cylinder, substantially as described.

2. The process of producing duplicate phonographic records, which consists in placing a blank record-cylinder adjacent to the inner indented surface of a cylindrical matrix, then passing into the chamber formed inside the record-cylinder a supply of steam under pressure, furnishing a supply of cool fluid under pressure to blow the steam out of the said record-chamber, complete the production of the phonographic record, and finally removing the record-cylinder, substantially as described.

3. The process of producing phonographic records, which consists in placing a blank record-cylinder within and adjacent to the indented record-surface of a cylindrical matrix and closing the ends of the record-cylinder so as to provide an interior chamber, next furnishing a supply of steam under pressure to such chamber and permitting it to blow through so as to prevent or minimize the condensation of the steam, furnishing a supply of air under pressure to complete the production of the record, and finally removing the record-cylinder, substantially as described.

4. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and the matrix, then closing the ends of the record-cylinder without closing the opening communicating with the space between the record-cylinder and matrix, then applying fluid under pressure within and heat to the record-cylinder, and then applying a cool fluid to the record-cylinder, and then removing the record-cylinder, substantially as described.

5. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and the matrix, then closing the ends of the record-cylinder without closing the opening communicating with the space between the record-cylinder and matrix, then applying steam under pressure within the record-cylinder, and then applying a cool fluid to the record-cylinder, and then removing the record-cylinder, substantially as described.

6. The process of producing records of the class described, which consists in placing a blank record-cylinder adjacent to the mold-surface of a matrix in position to provide an outlet-opening communicating with the space between the record-cylinder and matrix, then closing the ends of the record-cylinder with-

out closing the opening communicating with the space between the record-cylinder and matrix, then applying fluid under pressure to the record-cylinder and then removing the
5 record-cylinder, substantially as described.

7. The process of producing phonographic records, which consists in placing a record-blank adjacent to the mold-surface of the matrix in position to provide an outlet-open-
10 ing communicating with the space between the record-blank and the matrix, then arranging a movable head adjacent to the record-blank so as to form in combination with such blank a chamber without closing the
15 opening communicating with the space between the record-blank and matrix, then applying fluid under pressure within the chamber to complete the production of the record,

and then removing the record, substantially as described. 20

8. The process of duplicating records of the class described that consists in placing a blank record-cylinder adjacent to the record-surface of a matrix, supplying heated fluid against the exposed surface of the blank record-cyl- 25
inder until such cylinder has been softened, then furnishing a supply of cool fluid under pressure to said cylinder to complete the duplication of the record and finally removing the record-cylinder, substantially as de- 30
scribed.

THOMAS B. LAMBERT.

Witnesses:

THOMAS F. SHERIDAN,
BRIAN F. PHILPOT.

142,455

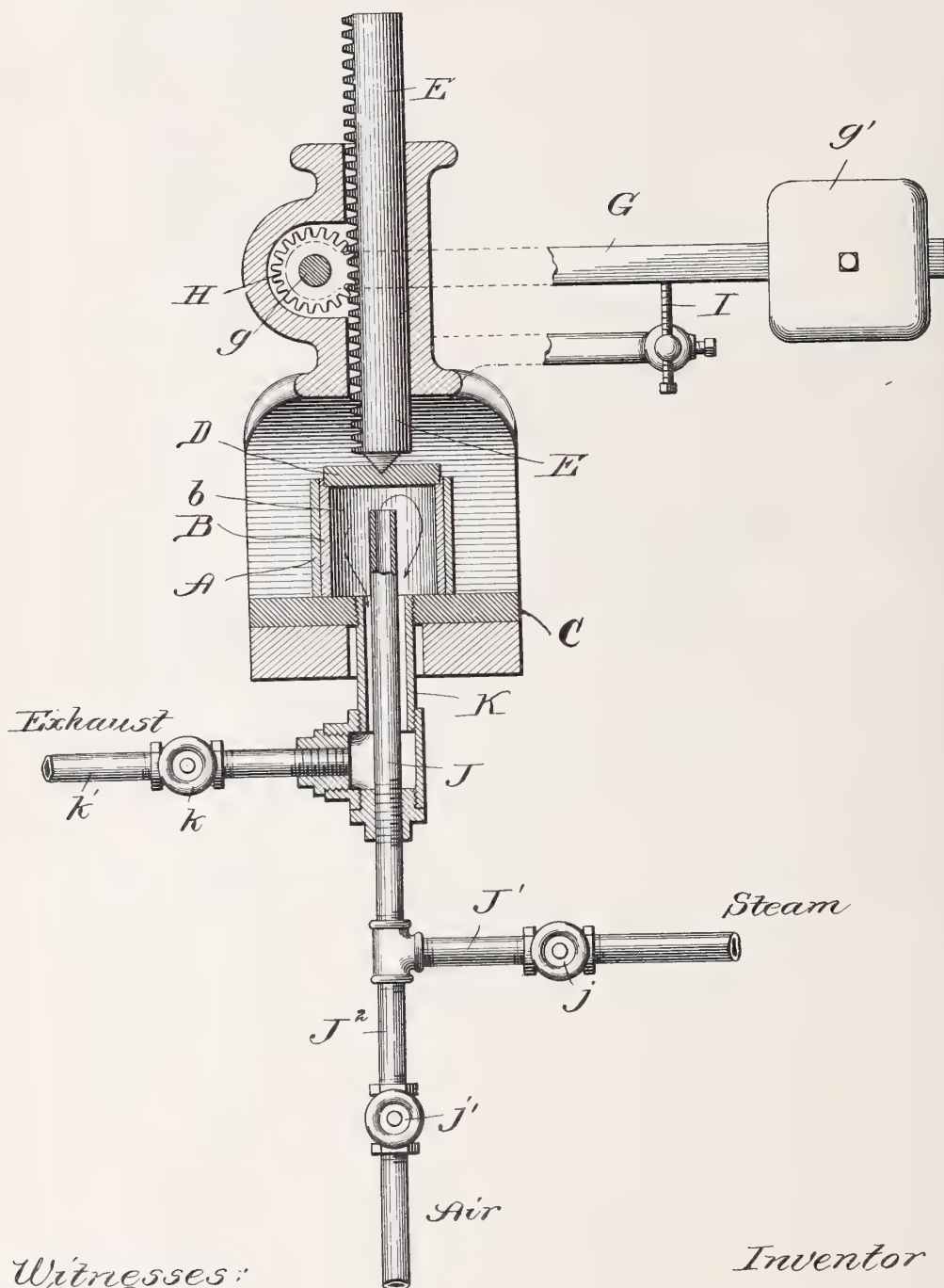
No. 742,455.

PATENTED OCT. 27, 1903.

T. B. LAMBERT.
APPARATUS FOR REPRODUCING PHONOGRAPHIC RECORDS.

APPLICATION FILED JUNE 14, 1900.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

THOMAS B. LAMBERT, OF CHICAGO, ILLINOIS, ASSIGNOR TO LAMBERT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

APPARATUS FOR REPRODUCING PHONOGRAPHIC RECORDS.

SPECIFICATION forming part of Letters Patent No. 742,455, dated October 27, 1903.

Application filed June 14, 1900. Serial No. 20,285. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. LAMBERT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Producing Duplicate Phonographic Records, of which the following is a specification.

This invention relates particularly to the processes by which the ordinary record now used in connection with phonographs may be duplicated any number of times, and especially to the reproduction of indestructible records, all of which will more fully hereinafter appear.

The principal object of the invention is to provide a simple, economical, and efficient apparatus for producing duplicate phonographic records; and the invention consists in the features, combinations, and details of construction hereinafter described and claimed.

The accompanying drawing represents a vertical sectional elevation of one style of an apparatus constructed in accordance with my improvements.

In constructing a machine in accordance with my improvements and using the same I provide a matrix A of the desired size, shape, and strength and which is preferably cylindrical in contour and formed of copper which has been electrochemically deposited upon a wax cylinder in the manner shown and described in Patent No. 645,920, issued to me the 20th day of March, 1900, and which it is therefore unnecessary to show and describe in detail here. The inner side of this copper matrix is provided, as is shown in the above-named patent, with a negative duplicate of a record-cylinder, and in order to make duplicates of the same I place within such matrix a blank record-cylinder B, formed of celluloid or similar substance. In fact, it can be formed of any substance which is susceptible of being softened by heat and rehardened by cooling. This blank record, which may be made of celluloid or other desirable material, is, as above stated, placed within the matrix, so that the record and matrix both rest upon a base C of the machine, which acts as a closure for one end of the record-

chamber b. A head portion D is next provided and placed upon the record-cylinder to complete the closure thereof. An air-tight chamber, which I will designate as the "record-chamber," is thus formed within the blank record-cylinder and between the movable head D and the base C. This movable head should be of such diameter as to leave an opening between it and the matrix when the head is in contact with the record-cylinder at a point within or near the matrix, and the opening should be narrower than the thickness of the record-cylinder. The opening will then be closed and sealed by the record-cylinder when pressure sufficient to expand it is applied within, and, as will be readily seen, this opening affords an outlet for the air to escape between the head and matrix and from between the record-cylinder and matrix. This arrangement of the head and matrix leaves the matrix to rest loosely upon the base without anything to hold it unyieldingly against the base. The natural irregularities of the adjacent surfaces of the matrix and base thus afford a sufficient opening between the lower end of the matrix and base to permit air to escape from between the record-cylinder and matrix. In fact, in the absence of anything to hold the matrix rigidly and unyieldingly against the base—such, for instance, as a head in unyielding contact with the opposite end of the matrix—the application of the pressure within the record-cylinder will force the air from between the record-cylinder and base however regular their adjacent surfaces may be. The natural irregularities of the adjacent surfaces, however, insure a sufficient vent when the relation of the head and matrix is as described. A gear-spindle E, slidably arranged above the head, is allowed to drop down thereon. A weighted lever G is provided and mounted upon the shaft g, that carries a pinion H, which meshing with a rack e operates the spindle above named and in connection with a stop-screw I determines the position and the amount of pressure with which this spindle may rest on the head. It is now desirable to soften the record-cylinder, so that it may be expanded out against the record-surface of the

matrix. In order to accomplish this, a fluid, preferably steam under about thirty pounds pressure to the square inch, is forced into the record-chamber through a pressure-supply pipe J, which is connected by means of a branch pipe J' with a suitable source of steam-supply. The steam is permitted to escape again out through an exhaust-pipe K, connected with the outer air by means of the branch K'. The steam is kept at a substantially uniform pressure within the record-chamber, so as to by means of its peculiar heating qualities and other actions soften the record and force it out against the inner indented surface of the matrix. After this has been accomplished, and experience teaches the operator just how long under certain pressure it takes steam to accomplish this result, the steam-supply is shut off by means of the valve *j*, and a supply of air under pressure is permitted to enter through the supply-pipe J by opening the valve *j'* on a second branch pipe J², which connects with a source of air under pressure and keeps up practically the same pressure as heretofore, but leaving the valve *k* on the exhaust-pipe open, so that all moisture and steam are blown out of the cylinder formed by the record, as above described. When the steam has been blown out, the next step is to shut off the valve *k* and permit air under the desired pressure to stay in the record-chamber until such blank record is substantially forced into all the indentations made by the record on the inner surface of the copper matrix. As soon as this has been accomplished the air-supply is shut off, leaving just enough air inside the record-chamber to cool the same, and the exhaust-valve *k* is opened sufficiently to permit the air to blow through under certain pressure, and thus assist materially in cooling the record-cylinder. When the duplication of the record-cylinder has been completed, the spindle E is raised, the head D removed, and the matrix, with its duplicate record, removed from contact with the apparatus. The cooling of the record-cylinder also shrinks it, so that it can be easily removed from engagement with the matrix.

Whenever desirable or necessary, the outer periphery of the matrix may be backed by plaster-of-paris, having a lead or other metallic confining-ring to give it sufficient rigidity to secure the duplication or reproduction of the records, and this is very clearly shown and described in the patent above referred to.

I claim—

1. In an apparatus for producing records of the class described, the combination of a frame, a cylindrical matrix arranged therein, a base portion and a head portion arranged at each end of the matrix and adapted to hold a blank record-cylinder within the matrix, forming in connection with and within the record-cylinder an air-tight chamber and arranged to leave a passage for air adjacent to the matrix and outside of the record-cyl-

inder, and means for admitting fluid under pressure into the chamber within the record-cylinder, substantially as described.

2. In an apparatus for producing records of the class described, the combination of a frame, a cylindrical matrix arranged therein, a stationary base, and a movable head portion arranged at each end of the matrix and adapted to hold a blank record-cylinder within such matrix, forming in connection with and within the record-cylinder an air-tight chamber and arranged to also form adjacent to the matrix and outside of the record-cylinder a passage for the outlet of air from within the matrix, means for admitting fluid under pressure into the chamber within the record-cylinder, and means for holding the movable head in operative contact therewith, substantially as described.

3. In an apparatus for producing records of the class described, the combination of a frame, an open cylindrical matrix arranged therein provided with indentations upon its inner surface, a base portion and a head portion arranged at each end of the matrix and adapted to partially close the same and hold a blank record-cylinder within such matrix in position to be operated upon and also forming in connection with and within such record-cylinder an air-tight chamber, means for admitting heated fluid under pressure into the chamber within the record-cylinder, means for permitting such fluid to escape, and means for admitting cool fluid within such chamber, substantially as described.

4. In an apparatus for producing records of the class described, the combination of a cylindrical matrix, a base portion, and a head portion arranged at the ends of the matrix and adapted to hold a blank record-cylinder within the matrix and close the ends of such cylinder forming in connection therewith a closed interior chamber, one of such inclosing end portions being out of contact with the matrix, substantially as described.

5. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and in connection with such cylinder and the base forming a chamber within the record-cylinder, and means for furnishing a supply of fluid under pressure into the chamber, substantially as described.

6. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion in contact with the other end of the blank record-cylinder and in connection with such cylinder and the base forming a chamber within the record-cylinder, and a pipe communicating with such

chamber adapted to form a passage for the admission of fluid under pressure thereto, substantially as described.

7. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet-passage communicating with the space between the record-cylinder and matrix and form in connection with the record-cylinder and base a chamber within such cylinder, means for holding the head in engagement with the record-cylinder, and means for furnishing a supply of fluid under pressure to the chamber, substantially as described.

8. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet-passage communicating with the space between the record-cylinder and matrix and form in connection with the record-cylinder and base a chamber within such cylinder, a spindle operating against the head portion to hold it in engagement with the record, and a pipe leading into one end of the chamber for furnishing a supply of fluid under pressure, substantially as described.

9. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet-passage communicating with the space between the record-cylinder and matrix and form in connection with the record-cylinder and base a chamber within such cylinder, means for holding the head in engagement with the record-cylinder independently of the matrix, a pipe communicating with such chamber and forming a passage for the admission of fluid under pressure thereto, and an exhaust-pipe also communicating with such chamber to permit the fluid to escape therethrough, substantially as described.

10. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet-passage communicating with the space between the record-cylinder and matrix and form in connection with the record-cylinder and base

a chamber within such cylinder, means for holding the head in engagement with the record-cylinder independently of the matrix, a supply-pipe for furnishing steam under pressure to one end of the record-chamber, an exhaust-pipe connected with the record-chamber for permitting the steam to blow therethrough and exhaust therefrom, and a branch pipe connected with the supply-pipe for furnishing a supply of air under pressure to the record-chamber, substantially as described.

11. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix provided with sound-record indentations thereon, a base portion arranged at one end thereof and in contact with the end of the blank record-cylinder to be operated upon, a movable head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet communicating with the space between the record-cylinder and matrix and in connection with such cylinder and the base forming a chamber within such record-cylinder, and a pipe arranged to communicate with the chamber and form a passage for the admission of fluid under pressure thereto, substantially as described.

12. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix provided with sound-record indentations thereon, a base portion arranged at one end thereof and in contact with the end of the blank record-cylinder to be operated upon, a movable head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet communicating with the space between the record-cylinder and matrix and in connection with such cylinder and the base forming a chamber within such record-cylinder, a pipe arranged to communicate with such chamber and form a passage for the admission of steam under pressure thereto, means for exhausting steam from the chamber, and means for furnishing a supply of cool fluid to such chamber, substantially as described.

13. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, the head portion arranged in contact with the other end of the blank record-cylinder and provided with means for holding the end of such cylinder in operative contact with such head while such end is out of contact with the matrix and, in connection with such cylinder and the base, forming a chamber within the record-cylinder, and means for furnishing a supply of fluid under pressure into the chamber, substantially as described.

14. In an apparatus for producing records of the class described, the combination of an

open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion in contact with the other end of the blank record-cylinder and, in connection with such cylinder and the base forming a chamber within the record-cylinder, means for holding each of the ends of such cylinder in operative contact with the cylinder-holding end portion while such cylinder end is out of contact with the matrix, and a pipe communicating with such chamber adapted to form a passage for the admission of fluid under pressure thereto, substantially as described.

15. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix, a base portion arranged at one end thereof and in contact with the end of a blank record-cylinder to be operated upon, a head portion arranged in contact with the other end of the blank record-cylinder and adapted to form an outlet-passage communicating with the space between the record-cylinder and matrix and form in connection with the record-cylinder and base an innermost chamber within such cylinder, means for holding the head in engagement with the record-cylinder independently of the matrix, and means for furnishing a supply of fluid under pressure to the chamber, substantially as described.

16. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix provided with sound-record indentations thereon, a base portion arranged at one end thereof and in contact with the end of the blank record-cylinder to be operated upon, a movable head portion arranged in contact with the other end of the blank record-cylinder and out of contact with the matrix and forming in connection with the base and cylinder a chamber, such head portion being provided with means for holding the end of such cylinder in operative contact with the head independently of the matrix to form a temporary passage between the cylinder and matrix, and a pipe arranged to communicate with the chamber and form a passage for the admission of fluid under pressure thereto, substantially as described.

17. In an apparatus for producing records of the class described, the combination of an open cylindrical matrix provided with sound-record indentations thereon, a base portion arranged at one end thereof and in contact with the end of the blank record-cylinder to be operated upon, a movable head portion arranged in contact with the other end of the blank record-cylinder and, in connection with such cylinder and the base, forming a chamber within such record-cylinder, such head portion being provided with means for holding the end of the cylinder in operative contact with the head independently of the matrix, a pipe arranged to communicate with such chamber and form a passage for the ad-

mission of steam under pressure thereto, means for exhausting steam from the chamber, and means for furnishing a supply of cool fluid to such chamber, substantially as described.

18. In an apparatus for producing records of the class described, the combination of a base portion adapted to receive and hold an indented matrix, a matrix mounted upon such base and arranged to encircle the cylinder to be operated upon, means for forming a record-chamber in connection with the blank record, means for furnishing a supply of steam under pressure to the record-chamber, and means for furnishing a supply of air to the same chamber, substantially as described.

19. In an apparatus for producing records of the class described, the combination of a base portion adapted to receive and hold a cylindrical matrix containing a blank record-cylinder and close one end of the chamber formed within such record-cylinder, a matrix provided with indentations upon its inner surface, a head portion arranged to close the other end of the record-cylinder, means for holding the head in engagement with the record, and means for furnishing a supply of steam under pressure to the chamber formed by the record-blank, substantially as described.

20. In an apparatus for producing records of the class described, the combination of a base portion adapted to receive and hold a cylindrical matrix containing a blank record-cylinder and arranged to close one end of the chamber formed within such record-cylinder, a matrix provided with indentations upon its inner surface, a head portion for closing the other end of the record-cylinder, a spindle operating against the head portion to hold it in engagement with the record, and a pipe leading into one end of the cylindrical chamber for furnishing a supply of steam under pressure, substantially as described.

21. In an apparatus for producing records of the class described, the combination of a base portion adapted to receive and hold a cylindrical metallic matrix containing a blank record-cylinder and arranged to close one end of the record-chamber formed within such record-cylinder, a matrix provided with indentations upon its inner surface, a head portion for closing the other end of the record-cylinder, a spindle operating against the head portion to hold it in engagement with the record, a pipe leading into one end of the record-chamber for furnishing a supply of steam under pressure, and means for furnishing a supply of air to the cylindrical record-chamber above described, substantially as described.

22. In an apparatus for forming records of the class described, the combination of a base portion adapted to receive and hold a cylindrical matrix carrying a blank record and close one end of the chamber formed within the blank record-cylinder, a matrix provided

with indentations on its inner surface, a head portion for closing the other end of the record-cylinder, a spindle arranged to contact the head portion, a weighted lever for operating the spindle and holding it at a predetermined pressure against the head, a pipe for furnishing a supply of steam under pressure to one end of the record-chamber, and an exhaust-pipe connected with the cylindrical record-chamber to permit the steam to blow therethrough and exhaust therefrom, substantially as described.

23. In an apparatus for forming records of the class described, the combination of a base portion adapted to receive and hold a cylindrical matrix and blank record-cylinder and close one end of the record-chamber formed within the blank record-cylinder, a matrix within which such cylinder is mounted, a head portion for closing the other end of the record-cylinder, a spindle arranged to contact the head portion, a weighted lever for operating the spindle and holding it at predetermined pressure against the head, a supply-pipe for furnishing a supply of steam under pressure to one end of the record-chamber, an exhaust-pipe connected with the record-chamber to permit the steam to blow therethrough and exhaust therefrom, and a branch pipe connected with the supply-pipe for furnishing a supply of air under pressure to the record-chamber, substantially as described.

24. In an apparatus of the class described, the combination of a matrix having a blank record-cylinder therein to be operated upon, a base portion arranged at one end of the blank record-cylinder and extending outward radially of such cylinder beyond the inner walls thereof, a head portion arranged at the other end of the blank record-cylinder and extending outward radially of such cylinder beyond the inner wall thereof to close the end of such cylinder for forming a pressure-chamber therein, and means for admitting fluid under pressure to such chamber, substantially as described.

25. In an apparatus of the class described, the combination of a base portion arranged at one end of a blank record-cylinder to close the end of such cylinder, a head portion movable independently of such base arranged at the other end of the blank record-cylinder to close such end and form in connection with the

base and cylinder a chamber, a matrix arranged outside of the record-cylinder, and means for admitting fluid under pressure to the chamber formed within the record-cylinder, substantially as described.

26. In an apparatus of the class described, the combination of a base portion arranged at one end of a blank record-cylinder to close the end thereof and adapted to support a matrix thereon, a matrix mounted upon such base outside of the record-cylinder, a head portion arranged at the other end of the blank record-cylinder for closing such end and forming in connection with the base and record-cylinder a chamber, and means for admitting fluid under pressure to such chamber, substantially as described.

27. In an apparatus of the class described, the combination of a base portion arranged at one end of a blank record-cylinder to close such cylinder, a matrix mounted upon such base and arranged to surround the cylinder, a head portion movable independently of the base arranged at the other end of the blank record-cylinder for closing such end and forming in connection with the base and record-cylinder a pressure-chamber, means for supplying heated fluid under pressure to such chamber, means for exhausting such fluid therefrom, and means for supplying cool fluid under pressure to such chamber, substantially as described.

28. In an apparatus of the class described, the combination of a base portion arranged at one end of a blank record-cylinder and extending outwardly radially of such cylinder beyond its inner wall to close the end thereof, a head portion movable independently of the base arranged at the other end of the blank record-cylinder and extending outward radially of such cylinder beyond its inner wall to close the end thereof for forming a pressure-chamber within such cylinder, means for admitting steam under pressure to such chamber, means for exhausting such steam therefrom, and means for admitting air under pressure thereto, substantially as described.

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Witnesses:

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742,666

No. 742,666.

PATENTED OCT. 27, 1903.

E. R. JOHNSON.
REPRODUCER SUPPORT FOR GRAMOPHONES.

APPLICATION FILED AUG. 8, 1900.

NO MODEL.

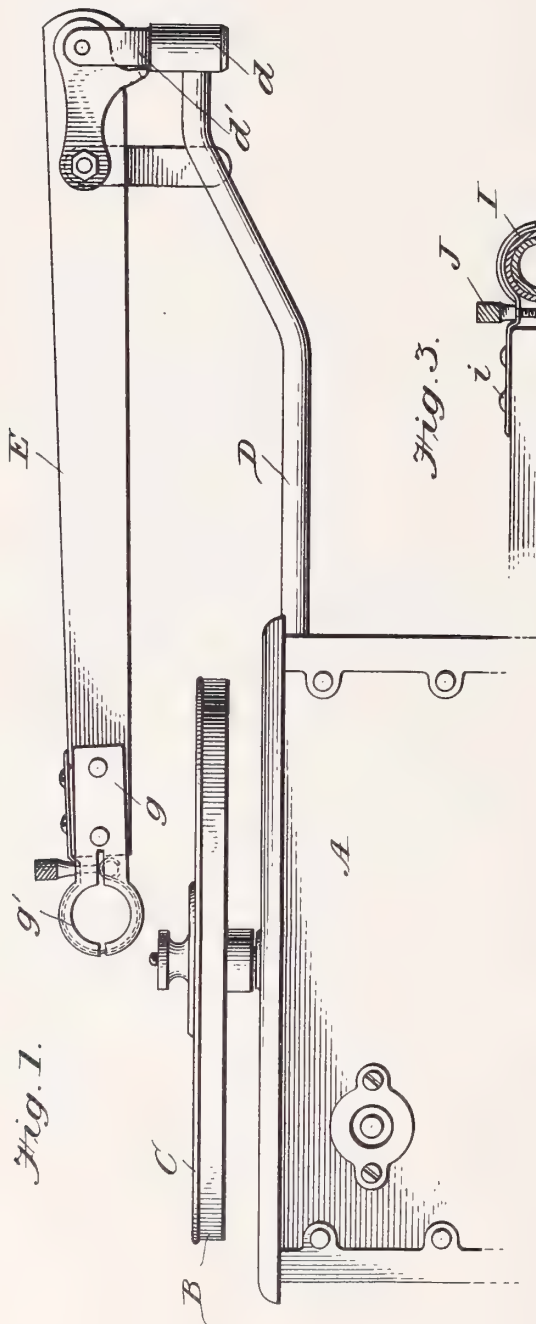


Fig. 1.

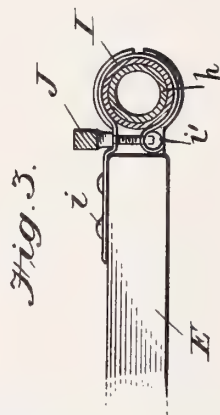


Fig. 3.

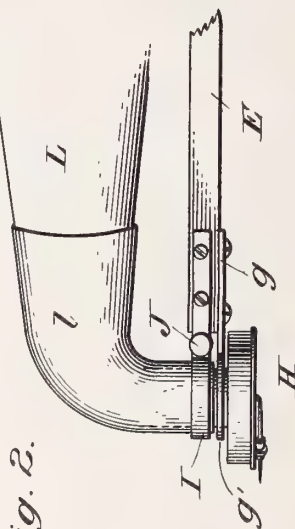


Fig. 2.

Witnesses.

Geo. T. Cross
Chas. T. Bennett

Inventor,

Eldridge R. Johnson,

by /s/ H. P. Ellis,
his Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

REPRODUCER-SUPPORT FOR GRAMOPHONES.

SPECIFICATION forming part of Letters Patent No. 742,666, dated October 27, 1903.

Application filed August 8, 1900. Serial No. 26,279. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Reproducer-Supports for Gramophones, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to certain improvements in gramophones, and more particularly to the mechanism for supporting the reproducer and its horn.

The object of the said invention is to provide improved means for holding the "sound-box" to its supporting-arm and mechanism for clamping the horn to the sound-box.

The invention consists in the construction and arrangement substantially as herein set forth, and fully pointed out in the claims.

Referring to the accompanying drawings, which form a part of this specification, and in which similar letters of reference are used to indicate similar parts, Figure 1 is a side elevation of a gramophone having my improvements applied thereto. Fig. 2 is a plan view illustrating the reproducing mechanism in position on its supporting-arm, a portion of the supporting-arm and horn being omitted. Fig. 3 is a detail view showing the reproducer-arm and clamp in elevation and the tubular section of the sound-box and horn in section.

In the said drawings, A designates the casing containing the motor mechanism, and B the revolving turn-table which supports the record C.

Extending from one side of the casing A is a bracket-arm D, carrying on its outer end a sleeve *d*, in which is pivotally mounted a bifurcated arm *d'*, which has the reproducer-arm E pivoted thereto.

On the inner end of the reproducer-arm E, I secure a flat plate *g*, having a split ring *g'*, formed integral therewith and extending out beyond the end of the arm E, the inner diameter of the said ring *g'* being of a size sufficient to snugly fit the tubular-section *h* of the reproducer or sound-box H, so that when the

section *a* is forced into the ring *g'* the said ring will firmly bind against this portion of the reproducer and hold it in position. On the top of the arm E, I secure a spring-clamp I, secured to the said arm E by means of the screws *i*. The free end of the arm E is bent in circular form and has secured to its end a solid piece of metal *i'*, in which is a screw-threaded aperture adapted to receive the lower end of an adjusting-screw J. The upper portion of the screw J passes through an aperture in the upper portion of the clamp I, as clearly illustrated in Fig. 3 of the drawings. Thus when the sound-box is placed in the support *g'* the tubular section *h* of said sound-box also extends through the circular portion of the spring-clamp I, and when the end of the horn *l* is placed over this tubular section *h* it also passes in the circular portion of the spring-clamp I, and by regulating the adjusting-screw J the band I is caused to bind the horn-section and the sound-box section together, and thus form a tight connection and a firm support for these parts. The elbow *l* on the inner end of the horn is generally made of leather and is of a size sufficient to snugly embrace the tubular section of the sound-box; but from constant usage this leather tube stretches and does not engage with sufficient degree of firmness to hold it in position, and consequently very often has to be tied or wrapped with wire, which is inconvenient and unsightly. My spring-clamp above described obviates any such difficulties and firmly holds the end of the horn to the sound-box and also helps to support the sound-box in its operative position. By unscrewing the screw J the spring-band I is expanded, and the horn and sound-box can be immediately removed.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a talking-machine, the combination with the reproducer-arm and reproducer, of a plate secured to the free end of the arm having its end projecting beyond the same, the said end being provided with a circular opening to hold the tubular portion of the reproducer and being split to form spring clamp—

ing-sections, a spring-band also secured to said arm and means for clamping said spring-band, substantially as described.

2. In a talking-machine, the combination
5 with a reproducer-arm and reproducer, of a horn, a flexible connection between said horn and reproducer, a plate secured to the free end of the arm having its end projecting beyond the same the said end being provided
10 with a circular opening to hold the tubular portion of the reproducer and being split to

form spring clamping-sections, a spring-band also secured to said arm and means for clamping said spring-band about said flexible connection and tubular portion of the repro- 15 ducer, substantially as described.

In witness whereof I have hereunto set my hand this 3d day of August, A. D. 1900.

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,

LEWIS H. VAN DUSEN.

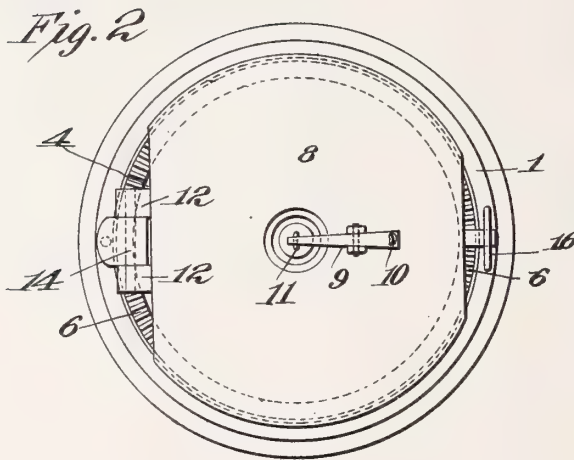
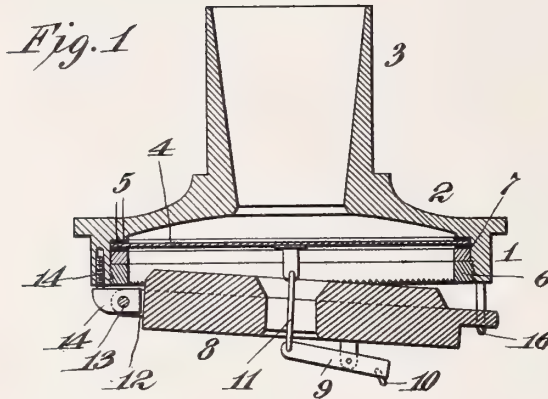
144, 106

No. 744,266.

PATENTED NOV. 17, 1903.

P. WEBER.
PHONOGRAPHIC RECORDER AND REPRODUCER.
APPLICATION FILED FEB. 6, 1901.

NO MODEL.



Witnesses:

Jas. F. Coleman
Jno. R. Taylor

Inventor

By *Peter Weber*
Atty Edmunds & Ayers
Att'ys.

UNITED STATES PATENT OFFICE.

PETER WEBER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC RECORDER AND REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 744,266, dated November 17, 1903.

Application filed February 6, 1901. Serial No. 46,168. (No model.)

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographic Recorders and Reproducers, (Case A,) of which the following is a description.

My invention relates to improvements in phonographic recorders and reproducers; and my object is to provide details of improvements in these devices for cheapening their cost of production and increasing their effectiveness.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a vertical sectional view illustrating a phonographic reproducer embodying my present improvements, and Fig. 2 a bottom view of the same.

In both of the above views corresponding parts are represented by the same numerals of reference.

The body 1 of the recorder or reproducer is annular and is provided with an upwardly-flaring disk top 2, having a neck 3 for attachment to the usual speaking or listening tubes. These parts are preferably cast in a single piece, whereas at the present time it is the custom to make the body 1 separate from the disk 2 and to secure such parts together by a clamping-ring. The diaphragm 4, made, preferably, of glass, is supported within the body 1 between rubber gaskets 5 5 and held in place by means of a clamping-ring 6, which engages threads cut on the interior of the body, said clamping-ring engaging a washer 7, so that the clamping-ring may be rotated without affecting the gaskets. This makes a very cheap, simple, and effective construction. The compensating weight 8 may be of any suitable type, and to which is pivoted the lever 9, carrying the recording or reproducing stylus 10, said lever being connected to the diaphragm by a link 11 in the usual

way. The compensating weight is provided with two ears 12 12, which are pivoted on a pin 13, passed through the head 14 of a screw 15, the latter engaging the body 1, as shown. By first pivoting the compensating weight on the head 14 the screw 15 may be engaged with the body 1 without being screwed entirely home, whereby the compensating weight will be free to partake of slight lateral movements (when used in connection with the reproducer) in order that the record may be properly tracked. At the other end the counteracting-weight is supported within a loop 16, having a sufficient horizontal width to permit the lateral movements in reproducing to take place. When, however, the device is used as a recorder, the loop may be in the nature of vertical guides to prevent lateral movements, as will be understood.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a device of the class described, the combination with an inclosing body and a diaphragm carried thereby, of a counteracting-weight, a lever pivoted to said weight and connected with the diaphragm, a stylus carried by said lever, and a threaded shank engaging the body and to which the weight is pivoted, substantially as set forth.

2. In a device of the class described, the combination with an inclosing body and a diaphragm carried thereby, of a counteracting-weight, a lever pivoted to said weight and connected with the diaphragm, a stylus carried by said lever, a threaded shank engaging the body and to which the weight is pivoted, and a loop for supporting the other extremity of said weight, substantially as set forth.

This specification signed and witnessed this 30th day of January, 1901.

PETER WEBER.

Witnesses:

HARRY F. MILLER,
J. H. MORAN.



No. 744,267.

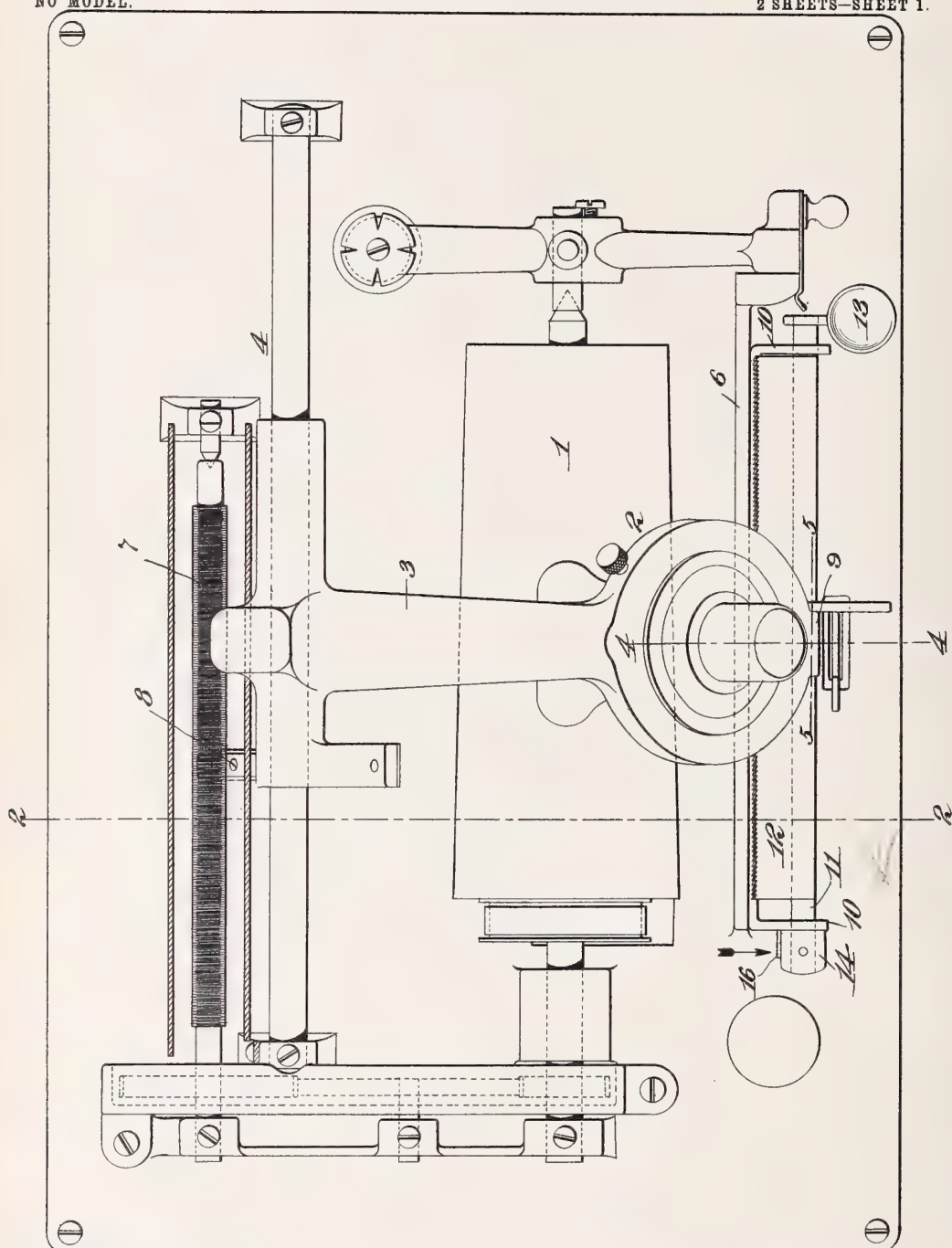
PATENTED NOV. 17, 1903.

P. WEBER.
PHONOGRAPHIC REPEATING MECHANISM.

APPLICATION FILED APR. 14, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

Arthur H. Baldwin.

Robert Radin.

Fig. 1

Inventor

Peter Weber

by Frank L. Ayer
Attorney.

744,267

No. 744,267.

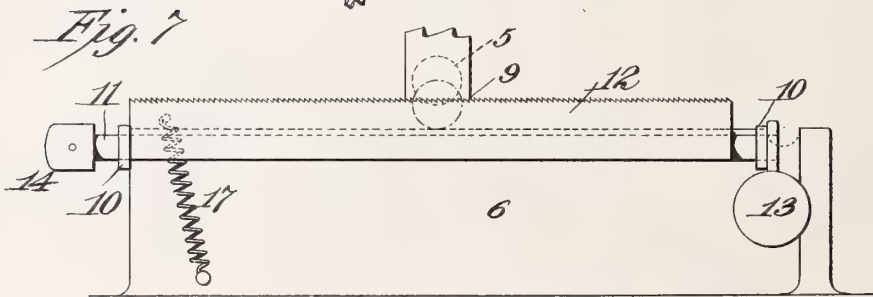
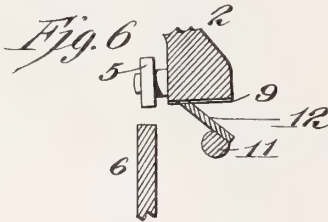
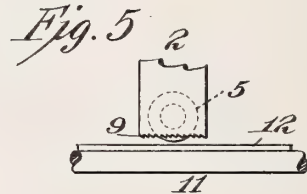
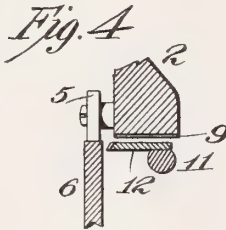
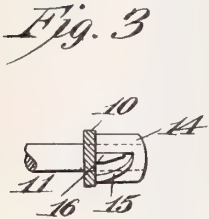
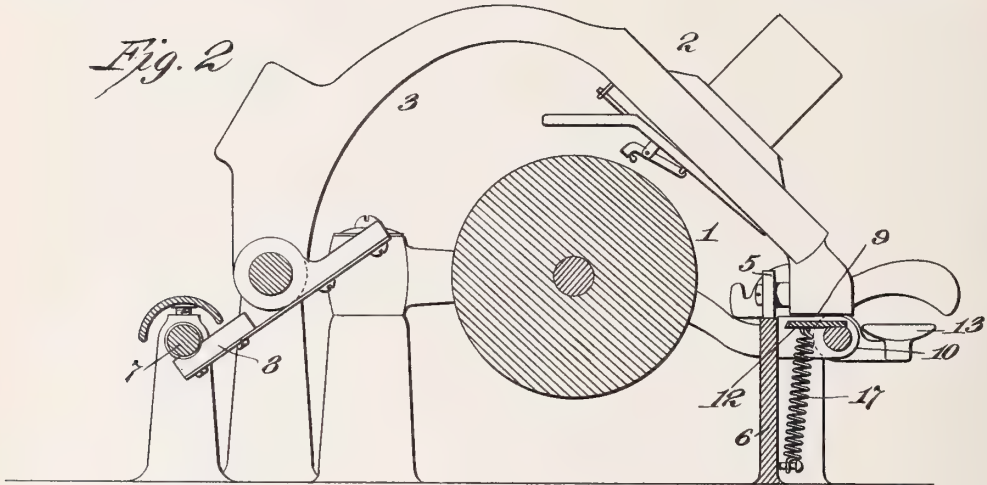
PATENTED NOV. 17, 1903.

P. WEBER.
PHONOGRAPHIC REPEATING MECHANISM.

APPLICATION FILED APR. 14, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

Arthur H. Baldwin.
Robert Raper.

Inventor

Peter Weber
by Grand L. Ober
Attorney

UNITED STATES PATENT OFFICE.

PETER WEBER, OF ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO NEW JERSEY PATENT COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC REPEATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 744,267, dated November 17, 1903.

Application filed April 14, 1903. Serial No. 152,484. (No model.)

To all whom it may concern:

Be it known that I, PETER WEBER, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Phonographic Repeating Mechanism, of which the following is a description.

My invention relates to various new and useful improvements in phonographic repeating mechanism by means of which the reproducer may be returned toward its starting position to the extent of a few threads, whereby a part of the record may be repeated.

The improvements are particularly designed for use in connection with phonographs intended for the study of languages or when phonographic dictation is to be transcribed.

My object is to provide a simple and efficient device for the purpose and one which can be readily applied to existing types of phonographs and other talking-machines. At the same time the device is neat and attractive in appearance.

Broadly considered, the invention consists in pivoting a toothed bar in such relation to the reproducer or its supports that by tilting the bar the reproducer will be elevated from the record and the feed-nut will be simultaneously disengaged from the feed-screw, whereby the reproducer will be free to be carried longitudinally of the record and independent thereof, and in combining with such a toothed bar a cam mechanism whereby the tilting of the bar results in a longitudinal shifting thereof, so as to move the reproducer toward its starting position to the extent of a few threads.

In order that the invention may be better understood, attention is directed to the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a plan view of a phonograph of common type with my present improvements applied thereto, the shield for protecting the feed-screw being shown in section; Fig. 2, a sectional view on the line 2 2 of Fig. 1; Fig. 3, an enlarged detailed view of the cam-head and pin for shifting the toothed bar looking

in the direction of the arrow in Fig. 1; Fig. 4, a section on the line 4 4 of Fig. 1; Fig. 5, a section on the line 5 5 of Fig. 1; Fig. 6, a view similar to Fig. 4, showing the toothed bar in its tilted position; and Fig. 7, a front elevation showing the toothed bar in its tilted position and moved to the full extent of its retracted movement.

In all of the above views corresponding parts are represented by the same reference-numerals.

The phonograph shown in the drawings is provided with the tapered mandrel 1, the reproducer 2, carried by the arm 3, slidably and pivotally mounted on the back rod 4 and having an antifriction-roller 5, working on the front bar 6, the feed-screw 7, and the feed-nut 8, engaging the feed-screw and carried by the reproducer-supporting arm 3, all as heretofore. In applying my improved attachment to a phonograph of this type I first form a series of serrations or teeth 9 on the under face of the front end of the supporting-arm 3, as shown. Secured to the front bar 6 are two brackets 10 10, in which is mounted a shaft 11, carrying a toothed bar 12, located normally immediately below and parallel with the serrated face of the arm 3. Preferably the teeth on the bar 12 are cut on a bevel, as shown in Fig. 6, so that when the bar is moved to its inclined position its teeth throughout their width will engage the teeth on the arm 3. The brackets 10 are spaced somewhat farther apart than the length of the toothed bar 12, so as to permit of longitudinal movement of said bar in operation.

In order to tilt the bar, I provide its shaft at one end with a small finger-lever 13. On the opposite end of the shaft 11 I secure a cylindrical head 14, formed with an inclined cam 15, (see Fig. 3,) and cooperating with this cam is a pin 16, projecting from the adjacent supporting-bracket 10. When the shaft 11 is partially rotated, the cam portion 15 does not engage the pin 16 until the toothed bar 12 has been tilted sufficiently to elevate the reproducer-stylus from the record, as well as to disengage the feed-nut 8 from the feed-screw 7. A spiral spring 17 extends between the

toothed bar 12 and the phonograph-frame and serves not only to return the toothed bar to its horizontal position, but also to return the bar laterally when the bar has been shifted to one side (see Fig. 7) by the operation of the cam mechanism. When the toothed bar is in a horizontal position, it engages one or both of brackets 10, which therefore act as limiting-stops.

10 In operation when it is desired to repeat any phonographic matter the finger-piece 13 is depressed, so as to tilt the toothed bar 12, which engages the toothed face of the arm 3 to lift the stylus from the record and to dis-engage the feed-nut 8 from the feed-screw 7.
15 The cam 15 now engages the stationary pin 16 and moves the bar 12 to one side for the distance of several threads. In this movement the finger of the operator will follow the finger-piece 13. When the finger-piece 13 is allowed to return to its normal horizontal plane, the natural inclination of the operator is merely to elevate the finger and not to also move it to one side. Consequently the
25 toothed bar does not reverse its longitudinal movement and deposit the stylus at the point where the stylus left the record; but the toothed bar is first moved directly to its normal horizontal position, so as to engage
30 the stylus with the record at a point several threads behind the point where the stylus left the record, after which when the operator's finger is released the spring 17 moves the toothed bar longitudinally to its
35 original position. In this way I have produced a repeating mechanism which has been entirely successful in actual practice and wherein I have dispensed with the necessity for complicated mechanism to cause the
40 toothed bar in its return movements to be positively operated and deposit the stylus on the record in a different line from which the stylus left the record.

45 Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

1. In repeating mechanism for talking-machines, the combination with the reproducer, feed-screw, and feed-nut, connected with the reproducer and engaging the feed-screw, of a pivoted toothed bar arranged to move longitudinally, and when moved pivotally to elevate the reproducer and disengage the feed-nut from the feed-screw, and cam mechanism
55 for shifting the toothed bar longitudinally when the bar is moved pivotally, substantially as set forth.

2. In repeating mechanism for talking-ma-

chines, the combination with the reproducer, feed-screw, and feed-nut connected with the 60 reproducer and engaging the feed-screw, of a pivoted toothed bar removably carried by the talking-machine, and arranged to move longitudinally and when moved pivotally to elevate the reproducer and disengage the 65 feed-nut from the feed-screw, substantially as set forth.

3. In repeating mechanism for talking-machines, the combination with the reproducer, feed-screw, and feed-nut connected with the 70 reproducer and engaging the feed-screw, of a pivoted toothed bar coöperating with the reproducer, and means for first tilting the toothed bar to elevate the reproducer and disengage the feed-nut from the feed-screw, 75 and for then shifting the toothed bar longitudinally, carrying the reproducer therewith, substantially as set forth.

4. In repeating mechanism for talking-machines, the combination with the reproducer, 80 feed-screw, and feed-nut connected with the reproducer and engaging the feed-screw, of a pivoted toothed bar arranged to move longitudinally and when moved pivotally to elevate the reproducer and disengage the feed- 85 nut from the feed-screw, a cam carried by the toothed bar and a pin with which said cam coöperates, whereby, after the toothed bar has been first elevated, it will be shifted longitudinally, carrying the reproducer there- 90 with, substantially as set forth.

5. In repeating mechanism for talking-machines, the combination with the reproducer, feed-screw, and feed-nut connected with the reproducer and engaging the feed-screw, of a pivoted toothed bar, removably carried by the talking-machine, and arranged to move longitudinally and when moved pivotally to elevate the reproducer and disengage the feed-nut from the feed-screw, and a single 100 spring for effecting return movements of the toothed bar, both pivotally and longitudinally, substantially as set forth.

6. A repeating attachment for talking-machines, comprising a pair of bearings arranged 105 to be secured to the talking-machine, a toothed bar mounted in said bearings, a cam-head on the shaft of said bar, and a pin carried by one of the bearings and coöperating with the cam-head, substantially as set forth. 110

This specification signed and witnessed this 11th day of April, 1903.

PETER WEBER.

Witnesses:

FRANK L. DYER,
ARTHUR W. BALDWIN.

744,339

No. 744,339.

PATENTED NOV. 17, 1903.

A. HAUG.

APPARATUS FOR THE MANUFACTURE OF PHONOGRAPH CYLINDERS.

APPLICATION FILED DEC. 22, 1902.

NO MODEL.

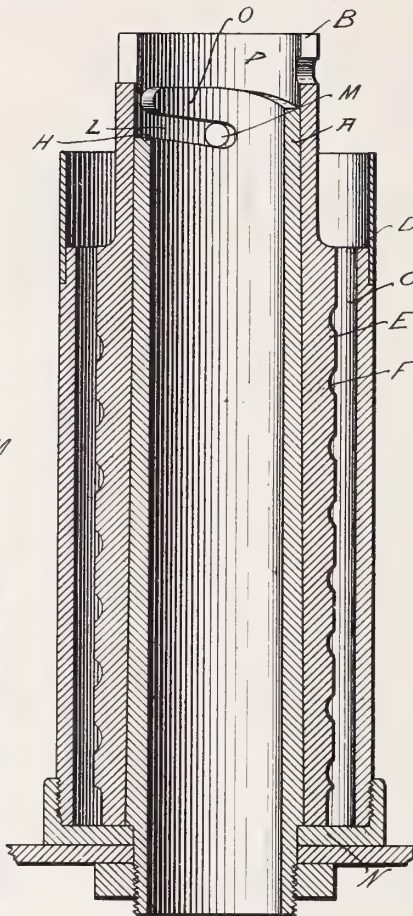


Fig. 1.

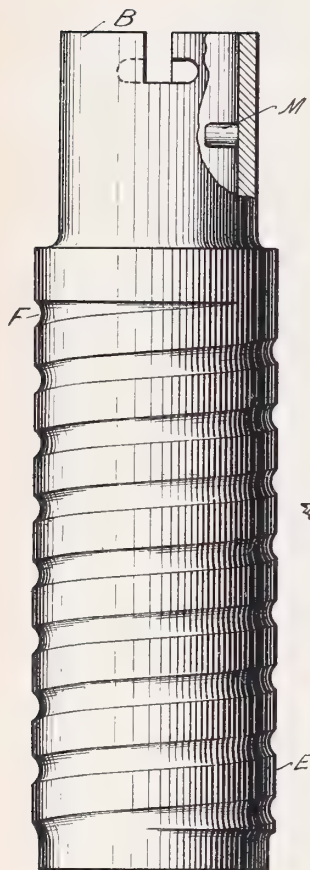


Fig. 4.

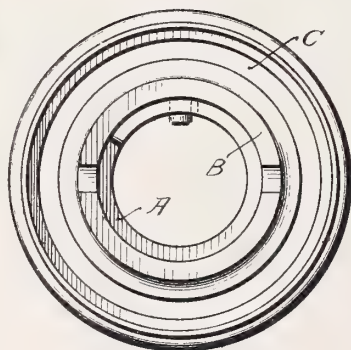


Fig. 2.

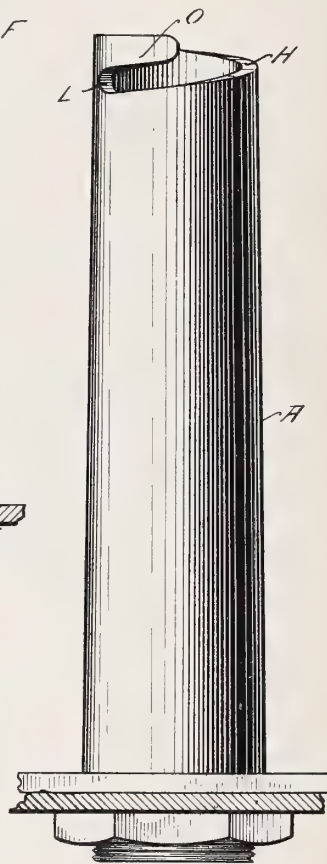


Fig. 3.

WITNESSES:

F. N. Roehrich
Thomas D. Dalton

INVENTOR

Andrew Haug

BY

Louis Hicks

ATTORNEY

UNITED STATES PATENT OFFICE.

ANDREW HAUG, OF WEST ORANGE, NEW JERSEY, ASSIGNOR OF ONE-HALF
TO EDWARD F. LEEDS, OF NEW YORK, N. Y.

APPARATUS FOR THE MANUFACTURE OF PHONOGRAPH-CYLINDERS.

SPECIFICATION forming part of **Letters Patent No. 744,339**, dated **November 17, 1903**.

Application filed December 22, 1902. Serial No. 136,099. (No model.)

To all whom it may concern:

Be it known that I, ANDREW HAUG, a citizen of the United States, residing at West Orange, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Apparatus for the Manufacture of Phonograph-Cylinders, of which the following is a specification.

This invention relates to apparatus for the manufacture by molding of phonograph-cylinders either with or without a sound-record thereon.

According to my invention the apparatus is so constructed that the molded phonograph-cylinder can be extracted more easily from the mold and without danger of breaking or injuring the molded cylinder.

My invention is illustrated by the accompanying drawings, which form part of this specification.

Figure 1 represents a vertical section of a mold embodying my invention. Fig. 2 represents a top view of the mold shown in Fig. 1. Fig. 3 represents the inner tube of the mold shown in Fig. 1, and Fig. 4 represents the core of the mold shown in Fig. 1.

The inner tube A of the mold tapers on the outside, as shown in Figs. 3 and 1, toward the top. The core of the bore B correspondingly tapers, so that when the core B is placed in position over the inner tube A, as shown in Fig. 1, the core B fits close upon the inner tube A.

C is the matrix or cavity of the mold shown in Fig. 1, into which the molten material from which the phonograph-cylinder is to be molded enters. The outer surface D of the matrix C is cylindrical, but the inner surface E of the matrix C is preferably tapering toward the bottom, as shown in Figs. 1 and 4. On the outer surface of the core B there is a spiral groove or hollow F for the formation of ribs or projections upon the inner surface of the molded phonograph-cylinder.

Upon the inner tube A there is a spiral ledge H or other suitable spiral guide, which spiral ledge or guide has the same pitch as the pitch of the spiral groove F. The inner tube A is also provided with a socket L, and a pin M, adapted to be received and to be held fast by the socket L, as shown in Fig. 1,

projects from the bore of the core B of the mold. As shown in Figs. 1 and 3, the socket L is so constructed that the pin M rises or falls as it travels out of or into the socket L, thereby causing the core B of the mold, to which the pin M is affixed, to rise or to fall with the pin M.

It will be understood, of course, that if the molded phonograph-cylinder is to be provided during the process of molding with a sound-record the outer surface D of the matrix C may be provided with a metallic negative of the sound-record which it is desired to mold upon the surface of the cylinder.

In adjusting the mold preparatory to molding the phonograph-cylinder the core B of the mold is placed upon the inner tube A and the pin M is moved into and securely locked by the socket L, as shown in Fig. 1. As the pin M moves into the socket L the pin M is forced downward by the upper side O of the socket L and carries downward with it the core B, so that the core B is pressed and held tightly against the bottom N of the mold, as shown in Fig. 1. Since the inner tube A of the mold tapers on the outside and since the bore of the core B correspondingly tapers, the core B fits close upon the inner tube A when the pin M is locked in position in the socket L. By reason of this construction and adjustment the molten wax or material used for the molding of the cylinder is prevented from entering between the inner tube A and the core B when the molten material enters the matrix C of the mold. When the cylinder has been molded and it is desired to extract the core B from within the cylinder, the core B is caused to revolve within the molded cylinder in such direction that the pin M will move out of the socket L. As the pin M moves out of the socket L it is forced by the sides of the socket to follow along the spiral guide H, thus causing the core B to be extracted from within the molded cylinder. Since the pitch of the spiral guide H is the same as the pitch of the spiral groove or hollow F, the internal ribs or projections of the cylinder, molded within the spiral groove or hollow F, move along and within the spiral groove or hollow F as the core B revolves within the molded cylinder. As above stated, the outer surface of core B

is preferably tapering toward the bottom. Hence as the core B revolves and rises within the molded cylinder in the process of extraction the core B soon becomes sufficiently separated from the parts of the bore of the molded cylinder to enable it to be entirely extracted with ease from the molded cylinder.

According to my invention and in the manner above described the core B of the mold can be extracted easily from the molded phonograph-cylinder without danger of breaking or injuring the cylinder. Since the inner tube A of the mold tapers on the outside and since the bore of the core B correspondingly tapers, the core B is readily freed and separated from the inner tube A as the core B revolves and rises in the process of extraction from the molded cylinder and is readily freed from any adhesion caused by wax or other material which while molten may have penetrated from the matrix C to a position between the inner tube A and the surface of the bore of the core B.

I claim as my invention—

1. In an apparatus for the manufacture by molding of phonograph-cylinders, the combination of the core of the mold provided with a spiral groove, a projection secured to the core, and a spiral guide for the projection in motion having the same pitch as the pitch of the spiral groove, substantially as described.

2. In an apparatus for the manufacture by molding of phonograph-cylinders, the combination of the core of the mold provided with a bore and with a spiral groove, a pin projecting from and secured to the bore of the core and a spiral guide for the pin in motion hav-

ing the same pitch as the pitch of the spiral groove, substantially as described.

3. In an apparatus for the manufacture by molding of phonograph-cylinders, the combination of the core of the mold tapering on the outside and provided with a bore and with a spiral groove, a pin projecting from and secured to the bore of the core, and a spiral guide for the pin in motion having the same pitch as the pitch of the spiral groove, substantially as described.

4. In an apparatus for the manufacture by molding of phonograph-cylinders, the combination of the inner tube tapering on the outside, the core of the mold provided with a correspondingly-tapering bore, a pin projecting from and secured to the bore of the core and a socket upon the inner tube adapted to receive and lock the pin, substantially as described.

5. In an apparatus for the manufacture by molding of phonograph-cylinders, an inner tube provided with a spiral guide, substantially as described.

6. In an apparatus for the manufacture by molding of phonograph-cylinders, an inner tube provided with a spiral guide and socket, substantially as described.

In testimony whereof I have signed my name to this specification, this 20th day of December, 1902, in the presence of two subscribing witnesses.

ANDREW HAUG.

Witnesses:

GRACE A. GRIMMOND,
THOMAS P. DALTON.

No. 744,586.

PATENTED NOV. 17, 1903.

E. H. MOBLEY.

SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

APPLICATION FILED FEB. 17, 1902.

NO MODEL.

Fig. 1.

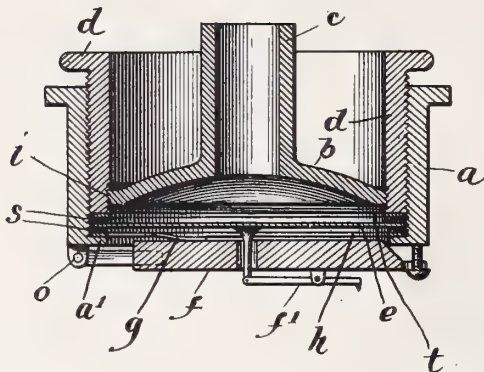


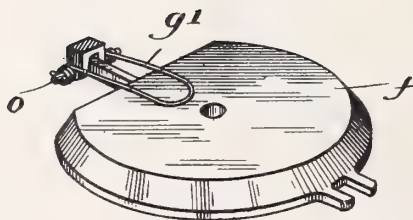
Fig. 2.




Fig. 4



Fig. 3.



Witnesses
H. B. Hallock.
R. M. Kelly.

Inventor
Edward H. Mobley
By his Attorney 

UNITED STATES PATENT OFFICE.

EDWIN H. MOBLEY, OF MORTON, PENNSYLVANIA.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 744,586, dated November 17, 1903.

Application filed February 17, 1902. Serial No. 94,393. (No model.)

To all whom it may concern:

Be it known that I, EDWIN H. MOBLEY, of Morton, Delaware county, State of Pennsylvania, have invented an Improvement in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a specification.

My invention relates to sound-boxes of sound recording and reproducing machines; and it consists of the improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

In reproducers such as are used in phonographs the stylus-lever is usually carried by a plate hinged at one side to the sound-box and adapted to exert more or less pressure on the stylus and make it follow the grooves of the cylinder. It is one of the objects of my invention to increase the pressure exerted by this plate and render it more uniform and certain without the necessity of increasing the weight of the plate or of employing weighted extensions.

Another part of my invention relates to the adjustability of the back plate of the sound-box to increase or decrease the air-space back of the diaphragm to suit changes in the volume of the tones, as a larger air-space is desirable with tones of large volume. A sound-box in which the air-space behind the diaphragm may be adjusted to suit the character of the tones is capable of producing much better results than one in which the size of the air-space is fixed.

In the accompanying drawings, Figure 1 is a vertical sectional view of a phonograph-reproducer embodying my invention. Fig. 2 is a perspective view of the detached spring and the ring which carries it. Fig. 3 is a perspective view of the stylus-lever plate and the depressing-spring, illustrating a modification; and Fig. 4 is a perspective view of the spring of the character shown in Fig. 2, in which the end of the spring is split or bifurcated.

Except in the matters hereinafter particularly noted, the sound-box may be of any suitable construction. As shown, it embraces the usual annular body *a*, back plate *b*, and tube *c*, clamping-bezel *d*, diaphragm *e*, and

hinged plate *f*, which carries the stylus-lever *f'*.

One part of my invention relates to the employment of a spring *g*, acting on the inner surface of the hinged plate *f* and tending to exert a slight downward or outward pressure, which maintains the stylus at all times in close contact with the surface of the cylinder. By the use of this spring I am able to do away with the weighting of the hinged plate or the use of a weighted leverage extension. The spring maintains the plate at all times under tension, so that its movements are gradual, and there is therefore less liability with the spring than with the weight of the plate bouncing or moving so quickly that the stylus may become disengaged from the grooves on the cylinder. It is desirable that this spring should be arranged to bear on the plate adjacent to the hinge, so as to leave the outer end of the plate free and unrestrained to move laterally and enable the stylus to find the grooves.

In the construction shown in Figs. 1 and 2 the spring *g* is in the form of a thin metal tongue extending inwardly from a thin metal ring *h*, which is placed on the flange *a'* of the annular body *a* and is held in place with the diaphragm and the usual rubber rings *s s* by the screw-threaded bezel *d*.

As shown, the ring *h* is so placed that the spring-tongue *g* is adjacent to the hinge-point *o* and bears upon the inner face of the hinged plate *f* on one side of the center.

In the modified construction shown in Fig. 3 I have shown a coiled spring *g'* coiled about the hinge-pin *o* at its ends and having a loop bearing upon the hinged plate.

In some cases, as where the upper face of the plate does not lie in a plane parallel to the face of the body or is uneven, the end of the spring *g* may be split or bifurcated, as shown in Fig. 4, and one spring may be made to bear upon the face of the weight with greater tension than the other, thus tending to straighten the plate and cause it to assume the proper position.

Another part of my invention relates to the adjustability of the back plate *b* to increase or decrease the air-space back of the diaphragm, which is desirable when variations

occur in the volume of the sound to be recorded or reproduced. For this purpose instead of clamping the back plate in place by the bezel I employ a back plate of a diameter equal to the inner diameter of the bezel and provide its edge with screw-threads *i*, which engage threads on the interior of the bezel, so that by screwing the back plate up or down in the bezel its distance from the diaphragm, and consequently the air-space afforded, may be varied. In practice very little movement is required. A quarter or half turn will ordinarily be sufficient to adapt the sound-box from a tone of high to one of low volume, but the extent of movement required will depend upon the pitch of the screw-threads.

As it would be objectionable to screw the bezel down upon the rubber or soft packing-rings, a metal or stiff washer *t* may be placed on the upper ring *s* to receive the thrust of the bezel.

I do not limit myself to the details of construction shown, as they may be varied without departing from the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a phonograph-reproducer, the com-

bination with the reproducer-head and the stylus-lever-carrying plate, of the ring *h* carried by the reproducer-head and provided with a spring-tongue *g* exerting an outward pressure on said plate. 30

2. The combination with the head of the sound-box and the clamping-bezel, of the back plate adjustably carried by the bezel to vary the air-space back of the diaphragm. 35

3. The combination with the head of the sound-box, and the clamping-bezel *d* carried thereby, of the back plate *b* adjustably connected with the interior of the bezel by screw-threads *i*. 40

4. In a phonograph-reproducer, the combination with the reproducer-head and the stylus-lever-carrying plate, of a spring between the head and plate having a divided or bifurcated end acting on the inner surface of the plate and exerting an outward pressure. 45

In testimony of which invention I have hereunto set my hand. 50

EDWIN H. MOBLEY.

Witnesses:

ERNEST HOWARD HUNTER,
J. W. KENWORTHY.

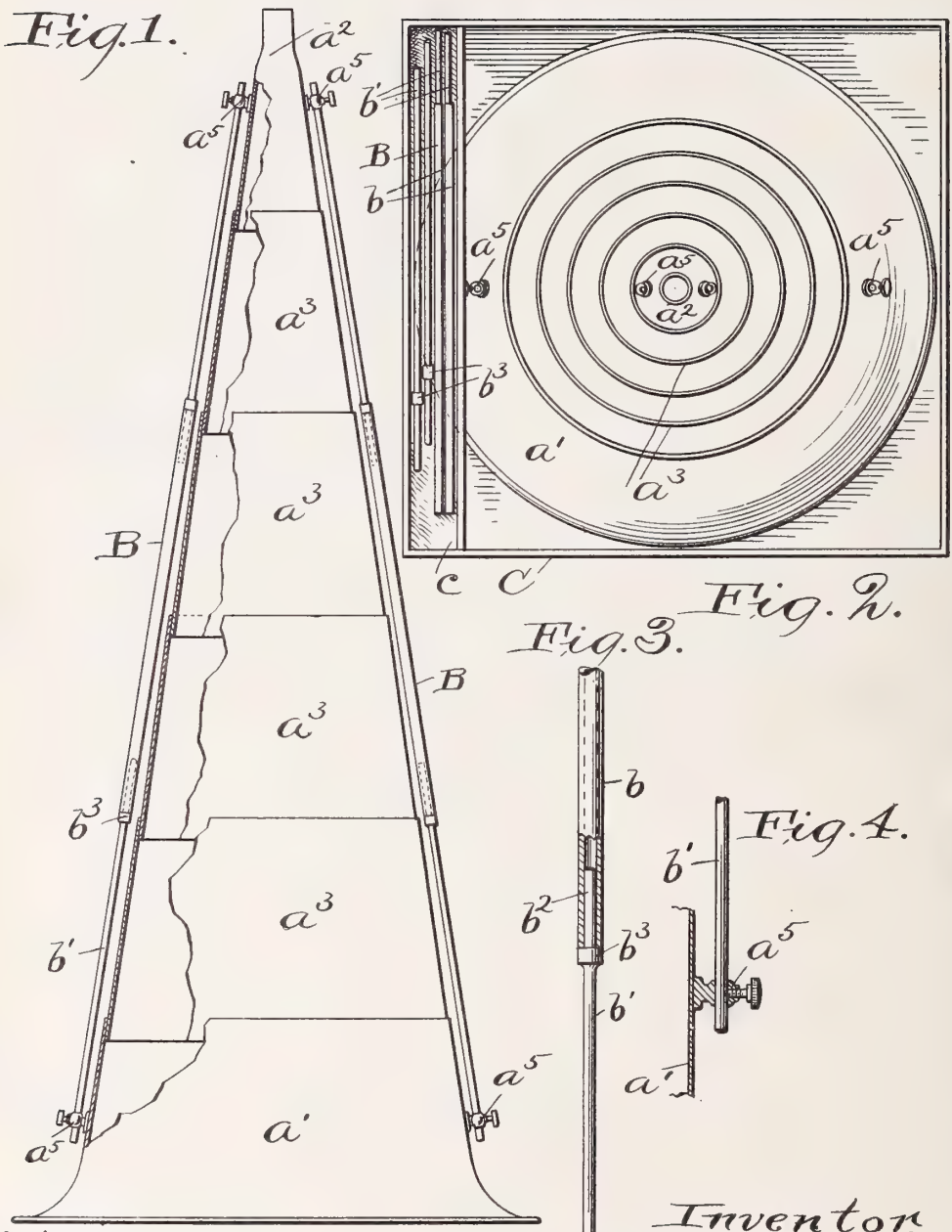
745,029

No. 745,029.

PATENTED NOV. 24, 1903.

L. DE VINEAU.
 COLLAPSIBLE HORN.
 APPLICATION FILED AUG. 1, 1903.

NO MODEL.



Witnesses.
 E. B. Gilchrist
 J. B. Hull.

Inventor,
 Louis de Vineau,
 By his Attorneys,
 Thurston & Bates.

UNITED STATES PATENT OFFICE.

LOUIS DE VINEAU, OF CLEVELAND, OHIO.

COLLAPSIBLE HORN.

SPECIFICATION forming part of Letters Patent No. 745,029, dated November 24, 1903.

Application filed August 1, 1903. Serial No. 167,843. (No model.)

To all whom it may concern:

Be it known that I, LOUIS DE VINEAU, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Collapsible Horns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to improvements in horns which are used in connection with phonographs or megaphones, and relates specifically to those which may be collapsed in a manner such that they will not occupy a great deal of space.

The invention further relates to certain means for holding a horn of this type in its extended position.

In the drawings, Figure 1 is a side elevation of the horn extended, being partly broken away to show the interior. Fig. 2 is a plan of the horn collapsed and contained within a suitable box. Fig. 3 is a side elevation of a portion of one of the sectional rods, and Fig. 4 is a section through the clamping-screw which secures the end of the rod.

The horn is made of any convenient number of sections, six being shown in the drawings. The largest section a' is shown with the usual flaring end, and the smallest section a^2 may be adapted to receive a mouthpiece or flexible tube. Between these sections are intermediate sections a^3 , each tapered and extending within the adjacent larger section and outside of the adjacent smaller section. Each of the sections are substantially the same height, so that the horn may be collapsed and occupy no more space than that necessarily occupied by the largest section. When the horn is extended, as shown in Fig. 1, the taper of the sections prevents its pulling apart, and it is held in this position by suitable rods B, which are clamped to the extreme sections a' and a^2 of the horn by means of clamps or binding-posts a^5 , which are secured to the extreme sections of the horn.

To enable the rods B to occupy small compass, they are made sectional. They consist, as shown, of an intermediate tubular section b and a pair of solid end sections b' . Each end section has an extension b^2 , adapted to

extend into the bore of the section b , and has an abutting and limiting shoulder b^3 .

C represents a square box, which is adapted to contain the collapsed horn. Within this box near its upper edge may be formed a small shelf or tray c' , adapted to contain the disconnected members of the rods B.

It will be seen that the horn which I have provided is neat in appearance when extended, has all the advantages of the usual one-piece horn, and may be collapsed into small and convenient space for carrying.

Having described my invention, I claim—

1. A collapsible horn consisting of telescoping sections adapted to stand each within the next larger or be extended, and a rod secured to the extreme sections for holding the horn in its extended position, said rod being separable into sections, substantially as described.

2. A collapsible horn consisting of tapered telescoping sections adapted to stand each within the next larger or be extended, the taper of the sections preventing them pulling apart when extended, and a rod outside of the horn and parallel with it and secured to the extreme sections for holding the horn in its extended position, said rod being separable into sections, substantially as described.

3. A collapsible horn consisting of telescoping sections, binding-posts secured to the extreme sections, and a rod adapted to extend into and be clamped by said binding-posts for holding the horn extended, substantially as described.

4. A collapsible horn consisting of telescoping sections, clamps secured to the extreme sections, and a rod adapted to be held by said clamps for holding the horn extended, said rod being made sectional and comprising a tubular member, and removable extensions adapted to extend thereinto, substantially as described.

5. A collapsible horn consisting of telescoping sections, and a rod for holding the horn extended, said rod being made sectional and comprising a tubular member, and removable extensions adapted to extend thereinto, said extensions having shoulders abutting against the ends of the tubular member and limiting insertion thereinto, substantially as described.

6. A collapsible horn consisting of a series

of tapered telescopic sections, each section extending into the next larger and outside of the next smaller whereby the horn may be collapsed or extended, binding-clamps carried
5 by the extreme sections of the horn, and substantially straight, narrow longitudinal rods adapted to lie parallel with the outer side of the horn and close to it and be engaged by said clamps to hold the horn extended.
10 7. A collapsible horn consisting of telescoping sections, binding-posts secured to the ex-

treme sections, and a sectional rod adapted, when extended, to project into, and be clamped by said binding-posts, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

LOUIS DE VINEAU.

Witnesses:

ALBERT H. BATES,
J. B. HULL.

15

No. 745,444.

PATENTED DEC. 1, 1903.

H. C. KESTEL.
ELBOW FASTENING FOR TALKING MACHINE HORNS.

APPLICATION FILED SEPT. 16, 1903.

NO MODEL.

FIG. 1.

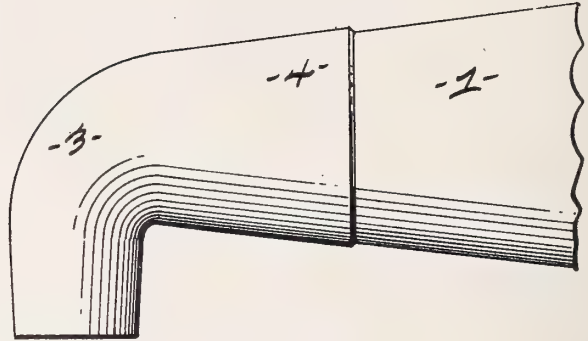


FIG. 2.

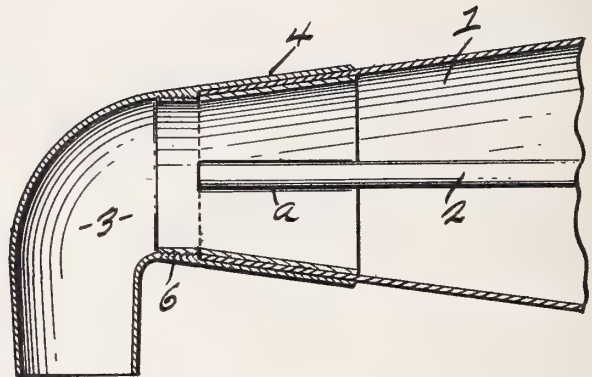


FIG. 3.

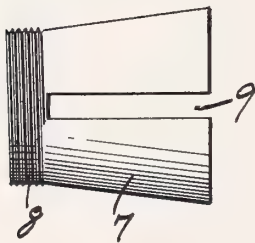
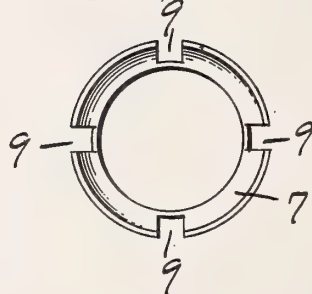


FIG. 4.



WITNESSES

Jo. Cunningham.
H. Ensign

INVENTOR

Harry C. Kestel
By *Edw. H. Kellum*

UNITED STATES PATENT OFFICE.

HARRY C. KESTEL, OF TOLEDO, OHIO, ASSIGNOR OF ONE-HALF TO HARRY ENSIGN, OF TOLEDO, OHIO.

ELBOW-FASTENING FOR TALKING-MACHINE HORNS.

SPECIFICATION forming part of Letters Patent No. 745,444, dated December 1, 1903.

Application filed September 16, 1903. Serial No. 173,375. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. KESTEL, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in Elbow-Fastenings for Talking-Machine Horns; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention has reference to improved means for fastening talking-machine horns; and it has for its object to provide an extremely rigid construction for detachably connecting a talking-machine horn with its elbow, the invention being simple, compact, inexpensive, easily operated, and presenting a neat appearance.

To this end the invention comprises the novel combination and arrangement of the parts hereinafter shown, described, and claimed.

In the drawings, Figure 1 shows my improved elbow-fastening in position upon the end of a horn. Fig. 2 is a longitudinal sectional view to disclose the relation of the parts when assembled. Fig. 3 is a side elevation, and Fig. 4 an end view, of the slotted sleeve which I employ.

Referring to the parts, 1 indicates a talking-machine horn of ordinary construction, having the usual conical shape, being formed of a single sheet of metal the edges of which are interlocked to provide a seam 2. This seam is preferably raised upon the interior face of the horn, the outer surface of the horn presenting a smooth appearance with the exception of a slight groove along the seam.

3 is a metal elbow having the usual right-angled extension for the attachment of a sound-box, the other end thereof being cone-shaped, as indicated at 4, and adapted to receive the small end of the horn. The elbow 3 is provided with internal screw-threads at 6, and 7 is a cone-shaped sleeve adapted to be screwed into the cone-shaped portion 4 of the elbow, being provided with screw-threads 8 upon its reduced end to engage the screw-

threads 6. The sleeve 7 is provided with a plurality of slots 9, extending from the screw-threaded portion through the enlarged end of the same, the portions of the sleeve divided by the slots 9 being resilient and adapted to yieldingly embrace the inner face of the horn. One of the slots in the sleeve is also provided for an additional purpose. When the parts are assembled as shown in Fig. 2, the seam of the horn takes a position in one of the slots, as indicated at *a*. Owing to the formation of the slots in the sleeve, the portions of the sleeve between the slots will lie in close contact with the inner surface of the horn, the resiliency of these portions compensating for any angular difference between the sleeve and the horn.

The operation of assembling the parts should be understood from the foregoing description when taken with the drawings. The slotted sleeve is first inserted into the large end of the horn and forced into place in the small end, the seam of the horn being made to take a position in one of the slots. The sleeve after insertion is firmly held in place, owing to the resiliency of the portions between the slots, and the screw-threaded reduced end thereof will project from the end of the horn. The elbow is then screwed into place, the walls of the horn being rigidly clamped between the sleeve 7 and the cone-shaped portion of the elbow.

It is apparent that instead of a plurality of slots in the sleeve 7 one slot only may be provided therein, the sleeve being thereby rendered resilient and capable of compression.

From the foregoing the novelty, utility, and advantages of my invention will be apparent.

Having described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. An elbow-fastening for talking-machine horns, comprising an elbow having a cone-shaped portion and provided with internal screw-threads, and a slotted, cone-shaped sleeve having a screw-threaded portion to engage the internal screw-threads of the elbow, substantially as described.

2. In a fastening for talking-machine horns,

the combination with a horn having a projecting seam upon its inner face, of an elbow having a cone-shaped portion to receive the end of the horn, and a cone-shaped sleeve adapted to be inserted within the horn and having a projecting end adapted to engage the elbow, the sleeve being provided with a slot to receive the seam of the horn, substantially as described.

10 3. In a fastening for talking-machine horns, the combination with a conical-shaped horn, of an elbow having a cone-shaped portion to receive the end of the horn, and a sleeve

adapted to be inserted within the horn having outwardly-extending resilient portions to press upon the interior of the horn and having a screw-threaded reduced end to engage the elbow, substantially as described. 15

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses. 20

HARRY C. KESTEL.

Witnesses:

CARL H. KELLER,
I. D. CARTWRIGHT.

745, 202

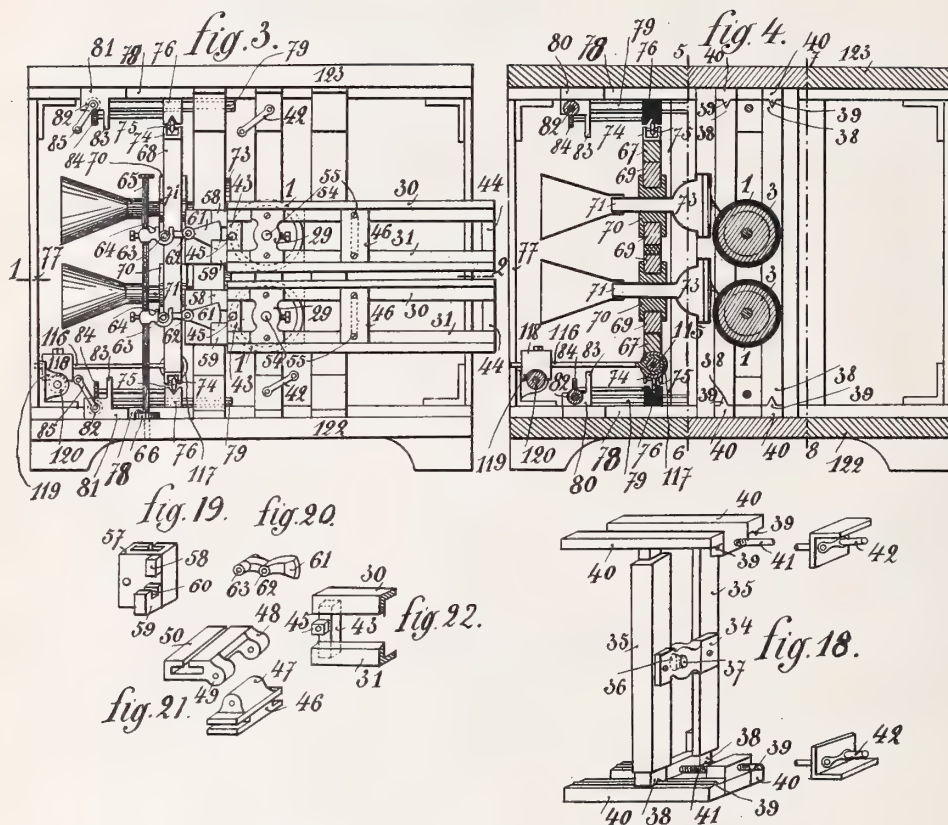


J. CASTELIN.
 PHONOGRAPHIC APPARATUS.

APPLICATION FILED DEC. 23, 1899.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:

Edw. J. Langlet
Charles J. Langlet

INVENTOR:

J. Castelin

UNITED STATES PATENT OFFICE.

JOSEPH CASTELIN, OF PARIS, FRANCE.

PHONOGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 745,782, dated December 1, 1903.

Application filed December 23, 1899. Serial No. 741,471. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH CASTELIN, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements Relating to Phonographic Apparatus, (for which I have applied for Letters Patent in France under No. 289,098, dated May 23, 1899,) of which the following is a specification.

The present invention relates to an apparatus which is called the "multiplex," by means of which any number of phonographic cylinders of any diameter and length may be engraved synchronously and at the same time.

The apparatus consists of the following parts, represented in detail in the accompanying drawings, in which—

Figure 1 is a front view of the apparatus with the trumpet device removed. Fig. 2 is a plan view, partly in section, on the line 1 2 of Fig. 1. Fig. 3 is a side elevation showing the movable doors. Fig. 4 is a transverse section on the line 3 4, Fig. 1, which is a section on the line 5 5 of Fig. 4, in order to show a front view of the block. Fig. 5 is a view of one of the movable axles. Fig. 6 is a section of the whole of the cylinders and cylinder-carriers on the movable axles in their position in the apparatus. Figs. 7, 8, 9, and 10 are sections of one of the cylinder-carriers. Fig. 11 is a section of the cylinder-carriers provided with collars. Fig. 12 is a view of a fixed pivot. Figs. 13, 14, and 15 are details of a movable pivot. Fig. 16 is a detail of the block. Fig. 17 is a plan view of the grooves of the base. Fig. 18 is a perspective view of the block. Figs. 19 and 20 show details of the bolt and the catch of the movable doors. Fig. 21 is a detail of the hinge of the movable doors. Fig. 22 is a detail of the end of the movable door.

In order to effect the registering of the phonographic cylinders of a desired length or diameter, the following operation is necessary: The cylinders 1 are threaded on the carriers 2, Figs. 6 to 10, which consist of slightly-conical parts 3, of wood, metal, or other material, terminating at the larger base in a reduced cylinder 4. These two parts, which form one piece, are hollow along their longitudinal axis 5, the cylindrical part being conically bored, as at 6. This arrange-

ment is intended to facilitate the introduction of the sleeves which serve to support the wax cylinders on the movable axles 10 11, Fig. 5. The conical part of the sleeve is of such dimensions that it will fit in an ordinary phonographic cylinder 1, and its base should be in the same plane as the extremity of the wax cylinder. It will be observed that the length of the truncated cone is less than that of the phonographic cylinder, so that there is provided a space 7 for removing the wax cylinder from above its sleeve by inserting two fingers into it. The advantage of this is that the operator is not obliged to touch the cylinder on the parts which are engraved, which certainly would damage them. Each sleeve is also provided at each end with a rubber washer 8 9.

The cylinders 1 can simply be supported by washers, Fig. 11, the extensions 3 of which serve as support 32 to the flanges of the cylinders 1. When the cylinders have been provided with washers or carriers, they should be placed on the movable axles of the apparatus. The movable axles consist of cylindrical rods 10 11, Fig. 5, hollowed out conically at 12 at one end. The hollow part ends in a conical portion 12, made along the axis of this rod at a distance of about 0.05 centimeter from one end 10. This rod is provided with a collar in the shape of a truncated cone 13 14, the end 14 of which is toward its other end, 11. The end 11 has a transverse groove cut upon it. The movable axles are arranged in the apparatus in the following manner: The end 10 is supported by the fixed pivots 23', carried by supporting disks or blocks 23, arranged vertically between the T-shaped brackets of the apparatus. In order to maintain them rigid during the registering of the cylinders, they are screwed into the block 34, Figs. 1, 2, 4, 6, 16, 18. The purpose of the block is to allow the separation of the movable axle from its movable pivot without, however, changing its horizontal position and at the same time to obtain such a rigidity as to allow the removal or insertion of the cylinders. The block consists of a plate 34, identical as regards form and the arrangement of its grooves with those (23 29) used for supporting the pivots. This plate may also be adjusted as regards position between two ver-

tical flanged standards 35 35 and placed parallel to the standards of the fixed pivots 27 27. The plate 34 is bored at the center partly conically, as at 36, and partly cylindrically, as at 37. The conical part is of the same shape as the cone 14, which is arranged on the movable axle. The standards 35 35 are united at the top and bottom by cross members in such a manner as to form a rigid frame. They are also provided at their ends with grooved parts 38, sliding on projections 39 of the bars 40. Screws 41, worked by means of a crank-handle 42, enter into the horizontal cross-bar. It will therefore be easily understood that when these screws, which can only be rotated and cannot move longitudinally, are turned they will move the whole of the framework and cause the two conical parts 14 and 36 of the movable axle 10 and of the block 34 to closely engage, owing to which the axle of the latter becomes immovable, while, on the other hand, the movable axle 10 11 will be free to turn round its pivots.

The cones 13 14 of the movable axles are introduced into the cone 36 of the block 34 with the aid of screws 41, operated at 42, so as to set the block, and the movable axles being made rigid the cylinders and their sleeves or washers are put in place. The arrangement of the sleeves is shown in Fig. 6. The sleeves 2 are arranged one after the other on the movable axles 10 11. The washer 9 of one sleeve rests against the washer 8 of the next sleeve. The washer 8 of the first sleeve presses against a washer 15 of a cylindrical part 16, secured on the movable axle 10 11 by means of a screw 17. In the same manner the washer 9 of the last cylinder presses against the washer 18 of a movable cylindrical part 19, the object of which is, first, to keep in position the movable axle, the end 11 of which enters into a recess 20 21 in this cylindrical part, and, secondly, to serve as a pivot therefor at 22 and to press all the sleeves together to form a single body with them and involving them all in its rotary movement. The end of each movable axle is pivoted on the point of a pivot called the "fixed" pivot 23', because once its position is determined it is not necessary to change its position during the operations for the engraving of the cylinders. This pivot, Figs. 1, 2, 6, and 12, is secured in a part 23, having in its center a hole 24, the diameter of the bore being equal to that of the cylindrical part of the pivot. The pivot is fixed in position by a set-screw 25. The metallic part 23 is provided at either side with grooves 26. By means of these grooves it is possible to raise or lower it vertically along the parallel faces of T-brackets 27 27 of the apparatus, on which it is fixed in position by means of set-screws 28. The pivots of the other extremity of the movable axle, Figs. 1, 2, 3, 6, 13, 14, and 15, are called "movable" pivots to distinguish them from the fixed pivots, because they form part of a system of parts which will be described as the

"movable" support. The movable pivots are mounted on parts 29, similar to those carrying the fixed pivots. There is, however, this difference, that the grooves are so arranged that they permit of the pivots being horizontally adjusted between the right-angled cross 30 31 of the movable support. The point of the movable pivots 29' is intended to enter the recess 22 of the part 19. The supports 29 for the movable pivots are mounted in the movable supports, which consist of two angled bars 30, Figs. 1, 2, and 3, connected at their ends by parts 43 and 44. The part 43 is provided with a projection 45, Figs. 2 and 3 and 22, which serves as a latch for the movable support. The parts 29, Figs. 1, 2, 3, 6, 13, 14, and 15, as before mentioned, are made to slide between the vertical side of the parts 30 and 31. By the side of the said part 29 is arranged another part, 46, Figs. 2 and 3, also provided with grooves and with a projection 47, which fits between the lugs 48 and 49 of a guide 50, Fig. 21. These two parts 46 and 50 are connected by means of a hinge-pin about which they can turn. The guide 50 forms a sheath for a T-shaped bar 51, to which it is fixed by means of screws 52 and 53. The parts 29 and 46 are also provided with set-screws 54 and 55. A vertical single bar 56 of the movable support carries a metallic guide 57, Fig. 2, similar to guide 50. This guide is provided at its upper end with a stop-block 58, Figs. 2, 3, and 19, and its lower end with a grooved projection 59, the face 60 of which is on the same vertical plane as the outer face of the block 58. This guide is adjusted along the T-angle bar 56 in such a manner that the projection 45 of the movable support will exactly fit between the two projections 58 and 59. On the guide 57 is arranged a latch 61, Figs. 2, 3, and 20, pivoted on an axle 62. The head of this latch is intended to enter into the recess of the projection 59 and prevent the projection 45 from leaving its recess, in which case the movable support is closed and all its parts are immovable, the pivot in this position resting against the axle of the cylindrical block 19.

The latches 45, closing the movable doors or supports or gates, terminate at the end in a horizontal pin 63, which engages a hook 64, fixed to the vertical rod 65. The latter can slide along its collars and insert its lower end into the bar; but to do this it is necessary that the part 66 should have pivoted and cleared the hole; otherwise the immovable rod strikes, by means of the hooks 64, the pins 63 of the latches. The latter having been secured, there is no risk of the block of the movable door or support slipping out of its recess.

The cylinders being mounted upon the movable axles, made immovable by the fixed pivots, the block, the movable pivots, and the movable door, as described, they are brought in contact with the carriage carrying the diaphragms. The carriage, Figs. 1, 2, 3, and 4,

is intended to support the diaphragm-holders, which may be displaced horizontally in a regular manner. It consists of two vertical parallel standards 67 and 68, at right angles to which are fixed, by means of set-screws, horizontal cross-bars 69, the ends of which are grooved in such a manner that they can slide up and down the said standards 67 and 68. Between the horizontal cross members 70 blocks 70 can slide, these blocks being identical in shape with those which support the pivots. The center is pierced by a hole, permitting the passage of a tube 71, fixed to the casing of the suitable diaphragm 73, a set-screw 72 fixing the position of the said tube. The lower and upper ends of the vertical standards terminate in brackets 74, in which are mounted rollers 75. There are four such brackets engaging in grooves in the upper and lower horizontal bars 76.

There is the means by which the uniform forward-and-backward movement of the carriage is effected for putting the diaphragms in or out of contact with the cylinders. The parts comprise the two frames 77, at the upper and lower ends of which are plates 78, provided on their outer faces with ledges 79, engaging grooves in the horizontal parts 76, which slide along the ledges. To each of these plates 78 are connected three parts—*i. e.*, the two flanges 80 81, which support an endless screw or worm 82, and an upward projection 83, which serves as a bearing for a threaded rod screwed into the transverse bar 76 and provided at its other end with a toothed pinion 64, engaging with the worm 82, the shaft of which is provided with a crank-handle 85. The object of this device is to effect a uniform forward-and-backward movement of the cylinders either already engraved or about to be engraved. Each diaphragm may be provided with an ordinary funnel; but preferably the distributing device for the sound-waves to the recording-diaphragm (illustrated in Fig. 5) is used. Two funnels 86 87 are connected at their smaller ends by a curved surface 88. The opening of the larger funnel 87 is turned away from the recording apparatus and serves for the reception of the sound-waves produced by the accompanying instrument. The mouth of the funnel 87 is screwed on the plate 89 by means of screws 90. The plate 89 is provided with conical holes 91, the number of which corresponds with the number of the diaphragm to be set in action. The conical holes are terminated by hollow spherical portions 91, into which fit spherical end portions 92 of tubes 93, slidingly mounted in tubes 94, which are fixed to a supporting-plate 96, which is nothing also but the front of the carriage, by means of a ball-and-socket joint 95 and screws 97. The end tubes 98 are connected with the receiving-tubes of the diaphragms to be actuated. In the interior of the funnel 87 there is arranged a trumpet 99, formed as a speaking-trumpet, the curved surface 100 of which

is a continuation of the curved surface of the outer receiver 87. The trumpet 99 is arranged in such a manner that there remains a free circular space between the extremity 100 and the inner face of the part 88, except some points of attachment 101, through which space the sound-waves arriving from the funnel-mouth 86 may penetrate into the funnel end 87. With the exterior end of the trumpet 99 there is connected, by means of a screw 103, a mouthpiece 102, into which the sounds to be recorded are emitted by the singer. The whole is supported at 104 on a solid rod 105, adjustable in height at 106 by means of a screw 107. The socket 106 is fixed to a horizontal tube 108, slidingly mounted in a rod 109, terminating in a bent portion 110, rotatably mounted in a bearing-piece 111, which is fixed, by means of a screw 113, to the plate 96. For fixing the rod 109 in any desired position a screw 112 may be provided. By this arrangement, first, the sound-waves emitted by a singer at 102 are distributed uniformly at 91 to the tubes 93 94, communicating with the diaphragms, and the sound-waves emitted by the accompanying instrument are also connected to the diaphragms; second, the recording-trumpet may be inclined at any desired angle with reference to the diaphragms; third, diminution of intensity of the sound is prevented, equalization of the sound in all diaphragms is obtained. In fact, cylinders of intense recording power are obtained.

During the registering the movable axle should be a rotating motion combined with the regular horizontal motion of the carriage carrying the diaphragm. The rotary movement of the movable axles is obtained by means of double rollers or wheels 114 fixed to the end of these axles, Figs. 1, 2, and 6, one of the said rollers or wheels receiving its movement from a suitable motor and transmitting it to the one immediately above it, and so on. The regular horizontal movement of the carriage is obtained by the following arrangement: A shaft 115, Figs. 1, 2, 3, and 4, fixed at its ends to the lower part 74 of the uprights 67 68, carries at its center a rigid bar 116, which is pivoted upon it at 117. This bar supports a block 118, curved and provided with part of a screw-thread on its lower part 119, so as to engage a cylindrical screw 120, which receives its rotatory movement from a roller or pulley 121, actuated by a motor provided for that purpose. In order to obtain a regular horizontal motion of the carriage corresponding to the rotatory motion of the movable axles, the same motor operates all the pulleys or rollers, and the pulley 121 is practically the driving-pulley, which transmits by a belt the uniform motion to the pulley 114.

The mechanism is supported by a base 122, and a part 123 serves as a cover. It will be understood that cylinders of all lengths and diameters can be arranged upon the same apparatus, as all the parts 23, 29, 34, and 70 are

arranged to slide and can be spread apart or brought together, while to permit the regulation of the supports of the movable doors, as well as those of the shafts, the base 122 and the top 123 are grooved at 124, so as to allow the stop-bolts 126 to be fixed in the holes 125.

The registering being finished, the movable doors are opened by raising the pawls 61, which disengage catches, after which the doors can be turned about the common axle of the parts 46, 47, and 50. The pivot of the axle 22 is separated from the socket 19, which allows the cylinder-carriage to be withdrawn.

What I claim, and desire to secure by Letters Patent, is—

1. The combination with a shaft of a series of sleeves mounted thereon as described, each sleeve comprising a conical portion and a cylindrical portion, the said cylindrical portion being reduced in diameter, and a series of cylinders mounted on the conical portions of the sleeves, the length of the conical portions of the sleeves being less than that of the cylinders mounted thereon whereby to provide a space between the cylindrical portion of each of the sleeves and the inner wall of the bore of the cylinder for the insertion of the finger, as set forth for the purpose specified.

2. The combination of a shaft with a series of sleeves mounted thereon as described, each sleeve comprising a conical portion and a cylindrical portion, the said cylindrical portion being reduced in diameter, and a series of cylinders mounted on the conical portions of the sleeves, the length of the conical portions of the sleeves being less than that of the cylinders mounted thereon whereby to provide a space between the cylindrical portion of each of the sleeves and the inner wall of the bore of the cylinder for the insertion of the finger, and a rubber washer at each end of each of the sleeves.

3. The combination with a shaft provided with a conical portion intermediate its ends, of a support for the shaft at one end, a support for the shaft at the other end comprising an adjustably-arranged block, a pivot car-

ried thereby in which the end of the shaft is mounted, an adjustably-arranged frame, a block carried thereby and provided with a conical bore adapted to engage with the conical portion of the shaft, and means for adjusting the frame and block carried thereby.

4. The combination with a shaft, of a cylindrical portion thereon, a washer carried by the said cylindrical portion, sleeves mounted on the shaft each comprising a conical portion and a cylindrical portion and washers carried at the ends of the conical and cylindrical portions, all being so arranged that the washers will abut in the manner specified.

5. The combination with a shaft and cylinders carried thereby, of brackets 27, a block having grooves in which parallel portions of the brackets fit, set-screws adjustably securing the block to the brackets, a pivot carried by the block and upon which pivot one end of the shaft is mounted, and means for supporting the opposite end of the shaft.

6. The combination with a shaft, cylinders mounted thereon and bearing a block 19 in which one end of the shaft is mounted, of means for supporting the other end of the shaft, a support comprising angled bars 30, 31, a block 29 carrying a pivot on which the bearing-block 19 is mounted and having grooves receiving portions of the bars 30, 31, on which the block 29 is adjustable.

7. In an apparatus of the character described, a sliding carriage comprising vertical standards, horizontal bars vertically adjustable on the standards, a block slidably arranged on the horizontal bars, and a diaphragm-supporting tube carried by the block, in combination with means for imparting a sliding movement to the carriage.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH CASTELIN.

Witnesses:

EMILE FAUGI,

MAURICE FAURÉ.

7th 1859

No. 746,609.

PATENTED DEC. 8, 1903.

P. VOGEL.
SPEAKING APPARATUS.
APPLICATION FILED MAR. 19, 1903.

NO MODEL.

Fig. 1.

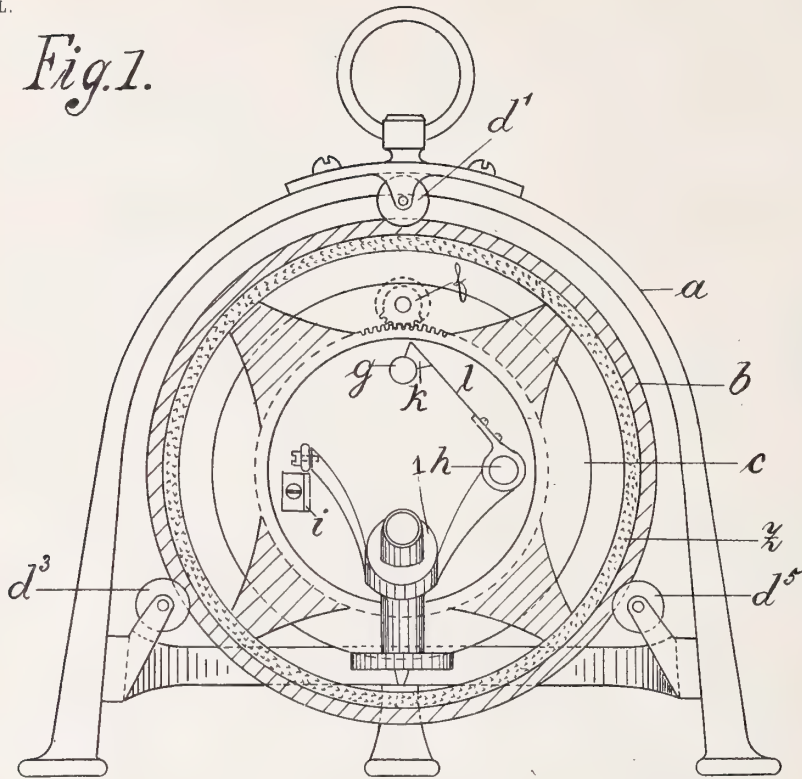
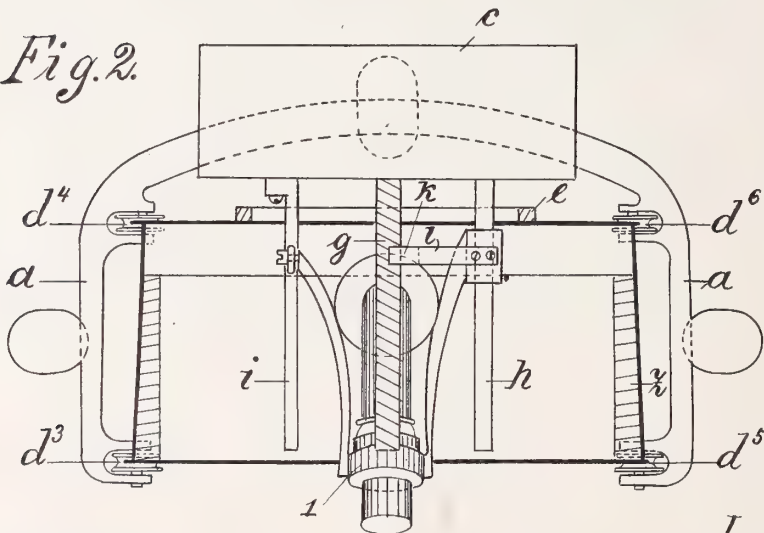


Fig. 2.



Witnesses:
H. M. Kuehn
H. M. Kuehn

Inventor:
Paul Vogel
By Richard
ATTORNEYS

UNITED STATES PATENT OFFICE.

PAUL VOGEL, OF BERLIN, GERMANY.

SPEAKING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 746,609, dated December 8, 1903.

Application filed March 19, 1903. Serial No. 148,638. (No model.)

To all whom it may concern:

Be it known that I, PAUL VOGEL, a subject of the Emperor of Germany, residing at Berlin, Germany, have invented certain new and useful Improvements in Speaking Apparatus, of which the following is a specification.

My invention relates to speaking apparatus in which the sound-waves are engraved in the usual manner of phonographs, but on the inner side of the hollow body or record-cylinder.

The device is illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of the device.
Fig. 2 is a plan showing a section of the roller space.

In the drawings, *a* is the stand, *b* the drum for carrying the body or record-cylinder, and *c* the clockwork for driving the device, *z* being the record-cylinder or body containing the sound-waves.

The reference-letters *d'* to *d''* represent grooved rollers suitably attached to the stand *a* and which are adapted to carry the drum *b* and to form a roller-bearing for the same.

Secured to the rear of the drum *b* is a spur-gearing *e*, which meshes with a gear *f*, driven by the clockwork. In the hollow space of the interior of the drum a spindle *g* projects. This spindle is screw-threaded and is secured to the clockwork, so as to be rotated thereby. Guiding-rods *h* and *i* are secured to a stationary part of the clockwork *c* and project into

the space in the interior of the drum. The usual membrane sliding carriage 1, having sliding connection with the rods *h* and *i*, is also provided. This carriage is operated by means of a threaded segment *k*, carried by a spring *l*, which is connected to one of the sliding connections of the carriage. The screw-threads of the segment engage with the threads of the spindle *g*. Thus as the latter rotates the segment is moved forward, carrying with it the carriage.

By the employment of the inner surface of the cylinder a more exact touching of the cylinder by the reproduction-pointer is obtained than by having the sound-waves on the outer side of the cylinder. Then, again, the grooves are protected from damage in packing, and the roller-drum does not act as a wedge or in a spreading manner, as in the old style of device, but as a hoop, tending to keep the cylinder together.

I claim as my invention—

In an apparatus for reproducing sounds, a hollow rotating body having an inner surface for carrying the record thereon, and stylus mechanism operatively engaging said inner surface.

In witness whereof I have hereunto set my hand in presence of two witnesses.

PAUL VOGEL.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

746,806

No. 746,806.

PATENTED DEC. 15, 1903.

J. H. FEDELER.
TALKING MACHINE RECORD.
APPLICATION FILED JULY 27, 1903.

NO MODEL.

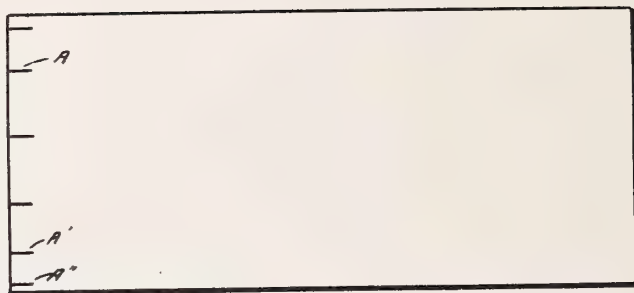


Fig 1

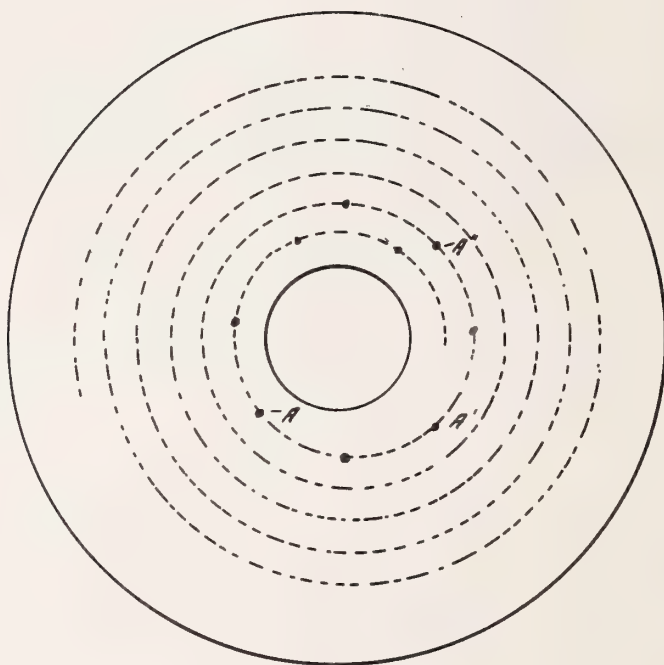


FIG 2

Witnesses

John Osterman
M. J. Zuehl

Inventor

John H. Fedeler

UNITED STATES PATENT OFFICE.

JOHN H. FEDELER, OF SCHENECTADY, NEW YORK.

TALKING-MACHINE RECORD.

SPECIFICATION forming part of Letters Patent No. 746,806, dated December 15, 1903.

Application filed July 27, 1903. Serial No. 167,220. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. FEDELER, a citizen of the United States, and a resident of Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Talking-Machine Records, of which the following is a specification.

My invention relates to records for talking-machines—such as phonographs, gramophones, &c.—and its object is to provide means by which records for such machines may be adjusted to reproduce the music or sound at the same speed as that at which the record was originally taken. In many cases in order to get the best effect from the record it is important that the exact speed at which the record was made should be reproduced. Although in practice phonographs are usually supplied with governors by which the speed may be adjusted, nevertheless no exact information as to the proper speed of each record is given; but the adjustment must be made according to the judgment of the operator. Moreover, if a notice as to the proper speed of operation accompanied each record it would afford no assistance in the proper adjustment of the governor unless a tachometer or other speed-indicating device was used. By my invention the speed can be properly adjusted with great exactness, so that not only the original sounds, but also the exact time or tempo of these sounds may be reproduced. Furthermore, the adjustment is accomplished without the use of a tachometer or similar auxiliary mechanism.

In the accompanying drawings, Figure 1 shows diagrammatically a cylindrical record of the form usually employed in phonographs. Fig. 2 shows diagrammatically a record in the form of a circular plate such as is used in some machines.

In the form shown in Fig. 1 the actuating member of the instrument travels around the record in a spiral from one end to the other. In order to obtain the indication for the proper speed, I form at one end of the record a series of index-marks A A', which may be either raised or depressed and which will produce a sound or knock in the instrument. It is evident that if these marks are so placed that when the record is revolving at the proper

speed a fixed number of marks will correspond to a certain interval of time. Then by counting the knocks or sounds produced by these marks the speed-governor may be properly adjusted to give exactly the correct speed. The index-marks A A' may be spaced on the record arbitrarily and then counted while the machine is running at the same speed as while the music or other record is being produced, or the marks may be made by the stylus of the instrument itself responding to gong or clock strokes, producing a fixed number of marks in a given time. In either case and with the marks produced in either of the ways described a simple notice accompanying the record of the proper number of these sounds for a given time will enable the operator to adjust the machine which is to reproduce the music or other sounds of the record to exactly the correct speed. The marks may be placed at either end of the record, as is most convenient. It will of course be understood that the sounds produced by these marks are used only for the purpose of adjusting the speed of the governor and do not occur during the reproduction of the music or other sounds of the record proper.

In the form of record shown in Fig. 2 the actuating member of the instrument travels around the plate in a spiral, as indicated by the curve. The marks A A' may be placed at either end of the spiral. The purpose and operation is the same as has been already explained and requires no further description.

It is obvious that a great variety of marks may be used for the purpose of my invention, and the marks may be made in a number of ways. Accordingly I do not desire to limit myself to the particular construction and arrangement of parts here shown, since changes therein which do not depart from the spirit of my invention and which are within the scope of the appended claims will be obvious to those skilled in the art.

Having thus fully described my invention, I claim as new and desire to protect by Letters Patent—

1. As a new article of manufacture, a talking-machine record with index-marks on its surface adapted to pass a certain point so that the frequency of their passing said point can be compared to a unit of time.

2. As a new article of manufacture, a talking-machine record having index-marks in its record-surface and adapted to make sounds of a given frequency whereby the speed of the
5 machine may be adjusted.

3. A record for a talking-machine provided in its record-surface with indicating-marks adapted to produce in said machine a series of arbitrary sounds, a certain number of said
10 sounds corresponding to a fixed period of

time when said record is operating at proper speed.

Signed at Pittsfield, in the county of Berkshire and State of Massachusetts, this 9th day of July, A. D. 1903.

JOHN H. FEDELER.

Witnesses:

FRDR. W. KNOPPE,
M. S. VAN VLEET.

C. C. & A. C. CLIFFORD.

RETURN MECHANISM FOR SOUND PRODUCING RECORDS.

APPLICATION FILED APR. 3, 1900. RENEWED MAY 19, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

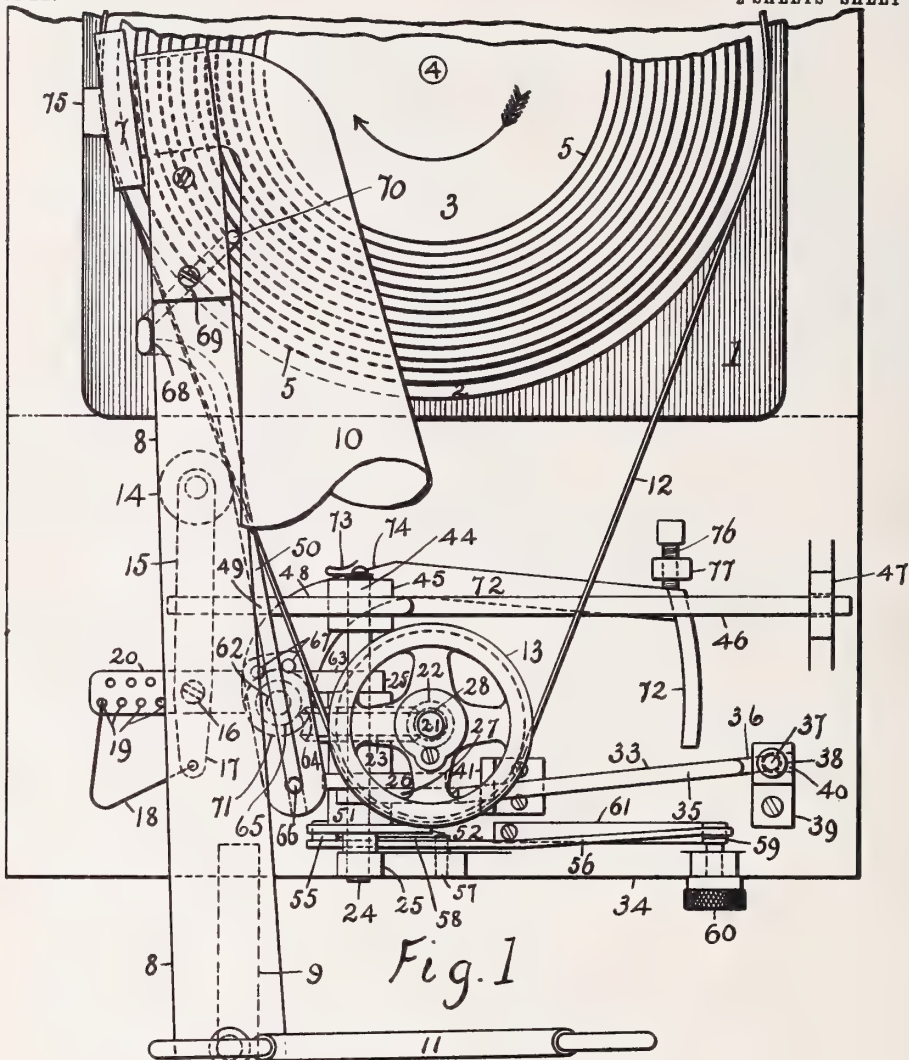


Fig. 1

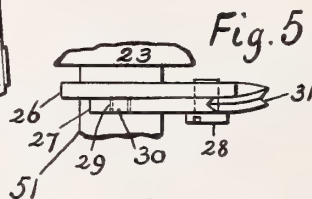


Fig. 5

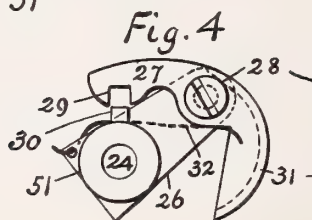


Fig. 4

Fig. 6

Inventors
Charles C. Clifford
Alfred C. Clifford
by R. C. Wright
Atty.

Witnesses
F. E. Craigmiles
L. J. Pyote

No. 747,299.

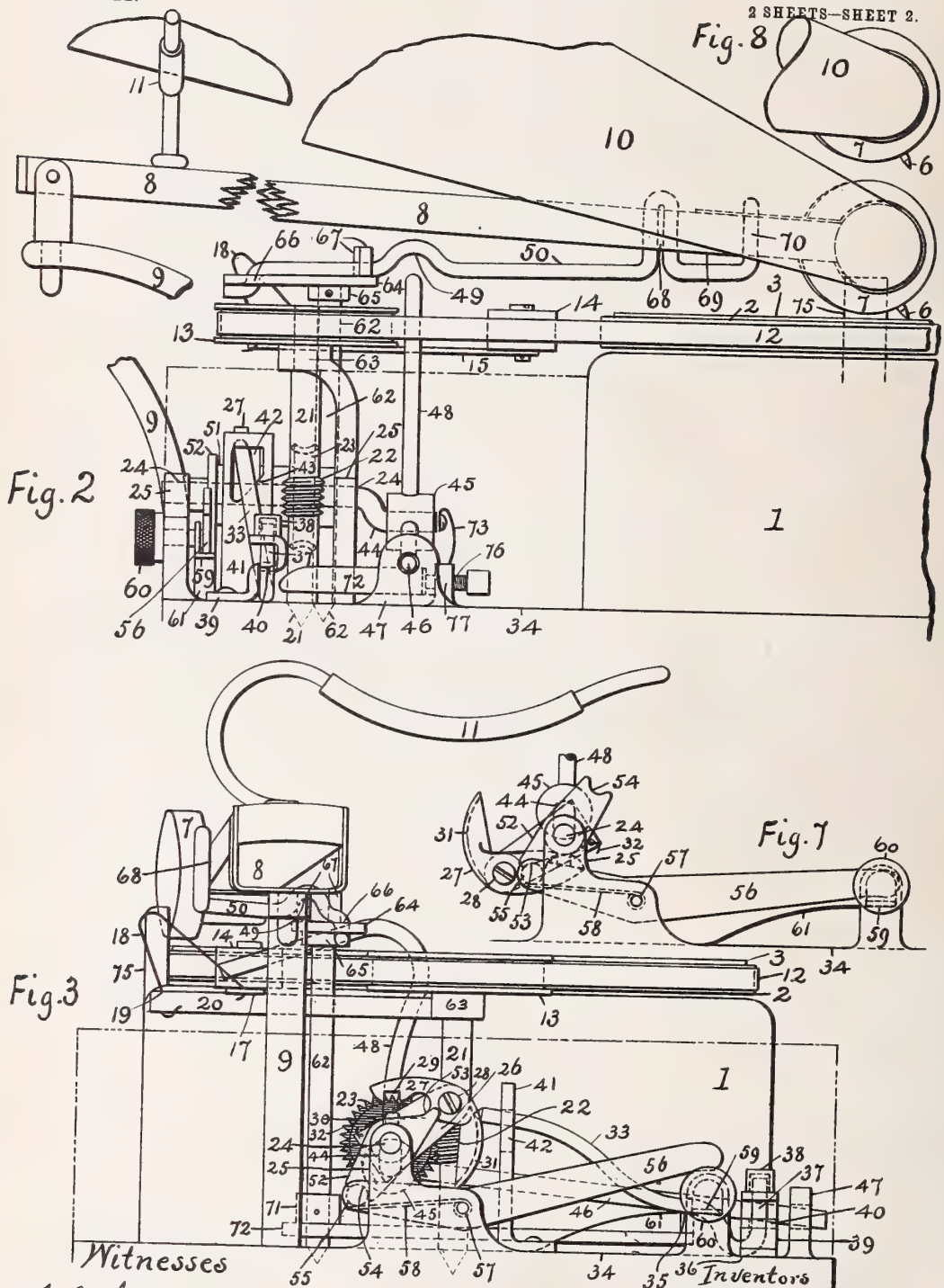
PATENTED DEC. 15, 1903.

C. C. & A. C. CLIFFORD.
RETURN MECHANISM FOR SOUND PRODUCING RECORDS.

APPLICATION FILED APR. 3, 1900. RENEWED MAY 19, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses

F. E. Crawford
L. J. Pyott

Inventors
Charles C. Clifford.
Alfred C. Clifford.
By *R. C. Wright*
Atty.

UNITED STATES PATENT OFFICE.

CHARLES C. CLIFFORD AND ALFRED C. CLIFFORD, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO JULIUS WELLNER, OF PHILADELPHIA, PENNSYLVANIA.

RETURN MECHANISM FOR SOUND-PRODUCING RECORDS.

SPECIFICATION forming part of Letters Patent No. 747,299, dated December 15, 1903.

Application filed April 3, 1900. Renewed May 19, 1903. Serial No. 157,834. (No model.)

To all whom it may concern:

Be it known that we, CHARLES C. CLIFFORD and ALFRED C. CLIFFORD, citizens of the United States, residing at Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Return Mechanisms for Sound-Producing Records; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Our invention relates to sound-producing instruments wherein a record is rotated, and thereby the sounds are reproduced, and we have shown for purposes of illustration our mechanism attached to a gramophone; and the particular object of our invention is to automatically shift the stylus and sound-box from the concluding to the commencing part of the record whether the record is of short or long duration and by the turning of a knob by hand release the locking means and start the record, and have shown the preferable means we employ in the accompanying drawings, in which—

Figure 1 is a plan view. Fig. 2 is a side elevation. Fig. 3 is a front elevation. Figs. 4, 5, 6 are detail views. Fig. 7 is a detail showing the locking at the end of the record. Fig. 8 shows the stylus and sound-box as elevated before the commencement of the record.

Similar figures of reference indicate similar parts throughout the views.

The instrument with which our mechanism is operated in the present instance is the well-known gramophone, in which the case 1 incloses a motor and above which is the disk 2, rotated by the motor, and on which is placed the record 3, centered by the projection 4. The record is a flat disk and is also used in several differently-named machines. Its upper surface or face is indented with a spiral line 5, which is formed by sound-waves, as is well known, the line commencing near the outer edge of the disk and thereafter

winding inwardly toward the center of the disk, the line, however, on different records varying as to its commencement from the edge of the disk or its diametral point and its termination depending upon the length of the record, and while in some instances it approaches quite close to the center of the disk it will in other instances be somewhat removed. The above is especially to be noted, as our mechanism when unlocked automatically starts the stylus to the commencement of the record-groove and also automatically picks up the stylus and sound-box when the record-groove terminates, returns them to the commencing-point, and locks the mechanism, regardless of the length of the record-line or its commencing or terminal position.

We are aware that machines are already in use where by means of adjustments for each different record the stylus returns; but ours at the termination of any record, long or short, acts automatically, and no adjustments are required. When a long record is replaced by a short one, or vice versa, the mechanism acts equally well.

In contact with the record 3 is the stylus 6, secured to the sound-box 7, which is secured at one end of a bar 8, which at its opposite end is pivotally supported on a bracket 9, and a horn 10 is carried upon a support 11 in the usual manner, these parts being of the usual general construction. A belt 12 is placed upon the edge of disk 2, passing partly around it and around a pulley 13 of our construction, and is the means by which we communicate motion to our mechanism. In order to secure an even tension of the belt, we place a binder-pulley 14 to run against its outside, support the pulley upon a lever 15, fulcrumed at 16, and having an end 17, in which we insert a spring 18, which at its opposite end may be inserted in any one of holes 19 in bar 20 which is found to be best for the purpose, and thus secure an even tension of the belt.

The wheel 13 is mounted on a vertical shaft 21, on which a worm 22 is made or which is secured thereto. The worm engages and rotates worm-wheel 23, which is loosely placed on horizontal shaft 24, which only partially rotates at the commencement and also at the

end of the record. The shaft is carried in bearings 25.

Attached to the hub of worm-wheel 23 is an arm 26, which rotates therewith and to which
 5 is pivotally attached a swinging pawl 27 by screw 28. The pawl has at its front end a notch 29, and its end exterior thereto is rounded to readily pass over pin 30 in hub
 10 51. Back of the pivot-screw 28 the pawl extends downward or at about a right angle to the front part and is curved at its back and top edges, and from the top down the back
 15 edge is provided with a groove 31. The back part of the pawl has a side offset, which reversely curves and passes back of arm 26, as best seen in Figs. 5 and 6. A spring 32 is
 20 secured to arm 26, and its free end engages pawl 27 back of fulcrum-screw 28, tending to cause notch 29 to engage pin 30. A pressure-
 25 bar 33, which engages pawl 27, is reversely and downwardly curved from its pawl-engaging end, but kept above foundation-plate 34 at point 35, after which it curves downward
 30 and then has a half-turn upward, forming a U shape, the rounded portion 36 being adapted to rest upon the foundation-plate, the back upright end 37 being inserted in a holder 38,
 35 mounted upon a bent support 39, in which is also formed a guiding-slot 40, opening outward. The rod fits freely in these parts,
 40 which permits its free movement at its front or pawl end both vertically and horizontally to enable the bar to freely follow the groove 31. The peculiar curvatures of the rod 33
 45 are not essential, provided its shape is such as to preserve the points 35 36 for the purposes hereinafter set forth. A guide-plate 41 is secured to the bed-plate near pawl 27,
 50 stands upright back of the pawl, and has a guiding-opening 42, through which rod 33 is inserted, the opening being formed with right-angled corners at its top, the right-hand side
 55 extending a less distance down than the left-hand side, and the sides joined at the bottom by an incline 43.

Shaft 24 at its inner end is bent to form a crank 44, on which is loosely placed a hub 45, in which at one side is inserted a rod 46, which extends outward and passes freely
 50 through an opening in lug 47 of the bed-plate. This construction permits crank 44 to turn in hub 45 to move it up and down and back and forth, while preventing its rotating. A
 55 lifter-rod 48 is inserted into the top of hub 45 and moves up and down and back and forth with the hub. The rod in its upward direction is curved backward, then forward, dipping down and passing under and beyond
 60 bend 49 of elevator-arm 50, which it elevates when crank 44 turns up and lowers when the crank descends.

Tightly secured on shaft 24 is hub 51. The hub abuts arm 26 at its inner end and at its outer end has secured to it a stop-plate 52,
 65 having a notch 53 at one end and a notch 54 at the opposite end, the notches being formed to engage pin 55, projecting from the inner

side of the end of locking-lever 56, which is fulcrumed at 57, where a spring 58 is secured, which at its free end engages pin 55 to cause
 70 it to enter notches 53 54. The lever 56 extends outward from its fulcrum and passes above an L-shaped lifter 59, operated by a hand-knob 60. A spring 61 is secured to the
 75 bed-plate and at its operative end presses against lifter 59, securing the lifter against self movement.

A vertical shaft 62 is stepped in the bed-plate and supported at its upper end in bearing 63. The shaft carries at its top a
 80 plate 64, secured to the shaft by its hub 65 to partially rotate with the shaft. The plate extends outward from the shaft at each end, one end being pierced by a hole 66, through
 85 which is inserted for free vertical movement the outer offset end of elevator-arm 50. At the opposite end of the plate 64 are fixed
 90 guide-pins 67, so placed at each side of the arm as to secure its side movement by plate 64 and also permit the elevation of the inner end of the arm by the lifter-rod 48. After
 95 passing pins 47 and bend 49 (heretofore described) the arm continues in course toward the sound-box; but before reaching it the arm is curved to the outer side of bar 8, above
 100 and outside of which it passes at 68 and doubling upon itself returns under bar 8 at 69 at an angle forward or outward, and then has an end 70 turned vertically above and
 105 inside of bar 8, forming a means to embrace bar 8, but not to tightly grasp it, as part 68 is to touch bar 8 and start stylus 6 to groove 5, and the end 70 is to touch when the end of the record-curve is reached, and the stylus is to
 110 be automatically returned to repeat the record or commence another.

At the lower end of shaft 62 is secured hub 71 of vibrator-arm 72, the arm being formed to first pass inwardly toward the record and then turn at about a right angle and pass in
 115 direction nearly parallel with rod 46 until at a point opposite curve 35 of pressure-bar 33, when arm 72 is formed concentric with the center of shaft 62. The agitator-bar is clear of the bed-plate; but its top at the curved end
 120 touches bar 33 at 35 soon after the stylus catches the sound-groove, as will be explained hereinafter. A spring 73 has one end secured to the crank 44 of shaft 24 to rotate therewith, and in so doing its free end will press against
 125 the inclined surface 74 of the vibrator-lever 72, when the crank 44 moves to lower the stylus 6 and sound-box 7 to the record 3, causing a movement of all parts attached to shaft 62 and advancing the stylus to the
 130 record-groove, when as soon as the stylus becomes engaged the spring 73 will become inoperative and cause no further movement of the agitator-lever or stylus, which will then be controlled by the sound-groove. A
 135 stop 75 is secured to the motor-case 1 to prevent the stylus from being carried beyond the edge of the record, and a stop-screw 76, inserted through lug 77, which may be ad-

justed to touch vibrator-lever 72, will accomplish the same purpose.

The operation of our mechanism is as follows: At the termination of the record the crank 44 will be swung up, as seen in Fig. 7, which action will move up and carry over rod 48, elevator-arm 50, bar 8, sound-box 7, and stylus 6 to the starting position, with the sound-box and stylus elevated above the record side, as seen in Fig. 8. Now by turning knob 60 to throw up lifter 59 the locking-lever 56 will be moved to disengage pin 55 from notch 53, thus permitting the mechanism to act and the parts to commence to move, and during the first half-rotation of shaft 24 the crank 44 will assume its lower position, as seen in Figs. 1, 2, 3, carrying down lifter-rod 48, when elevator-arm 50 will pass down free and clear of bar 8 at point 69, so that stylus 6 will touch the top of record 3. The spring 73 will sweep along incline 74, moving agitator-lever 72, partially rotating shaft 62, and moving plate 64, which by pins 67 moves elevator-arm 50 sidewise by engaging bar 8 at 68, and thereby moving sound-box 7, so that stylus 6 is carried to and engaged in the record's spiral sound-groove 5. During the time of the above movements the notch 54 of stop-plate 52 has engaged the pin 55 of locking-lever 56, as seen in Fig. 3, causing shaft 24, its crank 44, and all parts attached thereto and moved thereby to remain stationary, while the stylus follows the sound-groove to its termination. Owing to the spiral course of the sound-groove, together with its irregular waves, the arm 72 is continuously vibrated or agitated, and its curved part when in touch with pressure-bar 33 at 35 causes bar 33 to be also continuously agitated as long as the stylus follows the sound-groove. At each rotation of the worm-wheel 23 the arm 26 and attached pawl 27 make one rotation around shaft 24, and pressure-bar 33 at each rotation meets groove 31, elevates the front end of the pawl, and prevents the notch 29 from engaging pin 30. The bar is carried over to the short side of opening 42 in guide-plate 41 by the reversed curve of groove 31 and dropped on incline 43, which will move the bar over to the long side of opening 43 to meet groove 31 at the next rotation of the pawl; but when the curved part of agitator-lever 72 moves under and in contact with pressure-bar 33 at 35 its agitation then moves bar 33 over as long as stylus 6 follows groove 5. When bar 33 engages groove 31, the bar is carried against the top of opening 43, thus bringing pressure upon the pawl back of screw 28, elevating the front end of the pawl to clear pin 30, and this continues as long as the stylus follows the sound-groove. When the record is completed, the stylus 6 passes from the sound-groove 5 to the top of disk 3, and all agitation of lever 72 will cease. Bar 33 will now remain at the short side of opening 43 and will not engage groove 31 thereafter, and spring 32 will act, causing notch 29 to engage pin 30

to partially rotate shaft 24 to the position seen in Fig. 7, moving all of the connected parts and causing them to resume their proper places for the commencement of a new record, or if knob 60 and lifter 59 have not been turned or placed so as to lock lever 65 and pin 55 the record will be repeated.

It will be seen that our mechanism is entirely automatic when once started and if not locked to prevent it will continue to repeat as long as the motor continues to act.

As we have illustrated our mechanism it is shown as attached to existing machines; but with new machines it may readily be placed within the same case, and whether the motor is spring-wound or otherwise its power can readily be applied to operate our mechanism, only slight mechanical changes being necessary to accomplish such purpose. Dot-and-dash lines indicate the inclosing box or case we would employ in the present construction.

We claim—

1. In a reproducer return mechanism, the combination with a motor-driven disk, of a sound-record mounted on the disk, a sound-box, a stylus and a horn, of means to automatically move the stylus to the commencement of the sound-groove of the record, and at the termination of the record, regardless of its length and without special adjustment for each record, to automatically elevate and carry the stylus, its sound-box and the attached horn end to the side of the record, and above the same, and then lock the parts in said position in manner and form substantially as set forth.

2. In a reproducer return mechanism, a motor-driven disk, a record supported on the disk, a stylus attached to a sound-box and adapted to engage the record sound-groove, means for the movement of the stylus to the record, means to unlock the mechanism, and to continue said unlocking, regardless of the length of the record, and to then automatically return the stylus to the commencement of the record, after its termination.

3. In a reproducer return mechanism, a stylus and a sound-box supported upon an arm pivoted to allow said stylus to pass from one side toward the center of a motor-driven record having a sound-groove, means also connected to the arm to elevate the stylus above the record, and lock and stop the mechanism when the stylus has assumed that position, means to unlock and start the mechanism, means to lower the stylus to the record, a locking-lever and means to elevate it, means to carry the stylus to the sound-groove, and at the end of the groove means to automatically elevate the stylus above the record, return it to its first position above the record side, and stop the connected mechanism, substantially in manner and form specified.

4. In a reproducer return mechanism, a driven disk and record, a driven shaft, a second shaft, intermittently and partially rotat-

ing, a pawl and means for its rotating during the playing of the record, a pressure-bar engaging the pawl during its rotating, and after the mechanism is unlocked for the engagement of the stylus upon the record, means upon the pawl to move the engaging end of the pressure-bar to one side of the pawl at each rotation during such engagement of the stylus and record, and means to secure the pressure-bar from engagement with the pawl at the termination of the record, and thereby permit the pawl to then turn the shaft, and operate the lifting and return mechanism of the sound-box and stylus, and a locking-lever-engaging means to stop and lock the mechanism when so returned.

5. In a reproducer return mechanism, a driven record, a stylus adapted to engage the record and supported upon a bar pivotally supported at its end opposite the stylus, an arm under the bar supporting one end of the same above the record and having means to alternately form contact with either side of the bar, means to support the arm for swinging, a vibrator-arm attached to the supporting means of the aforesaid arm, a driven shaft having thereon means to intermittently rotate a second shaft placed at about a right angle to the driven shaft and having means to engage the arm aforesaid; means to lock the second shaft, means to unlock the second shaft, means to partially rotate the shaft and operate its means which engage the elevating-arm, in direction to lower the pivotally-supported bar, its supporting-arm, and the stylus to the record and thereafter still further lower the arm free from the under side of the bar, and means connected to and operated by the right-angled shaft to yieldingly engage the vibrator-arm and thereby move it, the supporting-arm and pivotal bar, toward the record's center and cause the stylus to engage the sound-groove of the record, in substantially the manner set forth.

6. In a sound-producing instrument, a record having a sound-groove, means to rotate the record, a stylus to follow the record-groove, means to unlock the rotating means, means to start the stylus into the groove, means to permit the stylus and its attached and operative mechanism to continue operative as long as the stylus follows the groove, and upon the passing of the stylus from the groove and upon the surface of the record, operative means to automatically lift the stylus from the record, return it to the side of the record and above and out of contact therewith, and lock and stop the mechanism from moving, in manner and substantially as set forth.

7. In a return mechanism, a record, a spiral sound-groove in the record, means to rotate the record, a stylus entering and following the groove, a bar pivotally supported and carrying the stylus, an elevating-arm, a swinging support for the arm, an operative means to lower the bar and the stylus at the com-

mencement of the record and driven by the means to rotate the record; a vibrator-arm attached to the swinging support of the elevator-arm, a pressure-bar supported at one end to permit the other end to move vertically and horizontally, and resting upon the vibrator-arm after the record has commenced to rotate; a shaft, a rotating pawl, pivotally supported, engaged by the pressure-bar at each rotation and rotated by the record-rotating means, and at each rotation having its engaging end pressed outward from its rotating center by the pressure-bar which, operated by the vibrator-arm, then engages means upon the pawl to carry the bar end sidewise during each rotation while the stylus follows the sound-groove, and upon the passing of the stylus from the sound-groove prevents the pressure-bar being carried sidewise in the guiding-opening in the guide-plate, and from engaging the pawl, and thereby permits the pawl to engage and operate the shaft and the return mechanism connected thereto which elevates the stylus from the record and returns it to its position at the side and commencement of the record, substantially in manner and form set forth.

8. In a return mechanism, a record, a locking-lever, a locking-plate and a locking-pin, the plate so constructed as to be turned and thereby release the lever from engagement by its pin, said locking-plate being secured to a shaft, which, when such release takes place is driven to make a semirotation and by means thereto attached and operated lowers a stylus to a sound-groove record, forces the stylus to engagement with the groove, and permits the rotating of the record; means to permit the continued running of the record as long as the stylus follows the sound-groove, and upon the passing of the stylus beyond the sound-groove, means to unlock the shaft aforesaid, means to rotate the shaft after its unlocking, move its connected mechanism to elevate the stylus, and remove it to its original position above and at the side of the record, in manner and form substantially as set forth.

9. In a return mechanism, a driving-shaft, a worm upon the shaft, a driven shaft, a worm-wheel driven by the worm and surrounding and rotating freely around the driven shaft, an arm secured to the worm-wheel, a pawl pivotally secured to the arm, and means attached to the arm and adapted to force the engaging end of the pawl toward the driven shaft, substantially as described.

10. In a return mechanism, a driven shaft, a worm upon the shaft, a worm-wheel driven by the worm, a shaft about which the worm-wheel rotates, an arm secured to the worm-wheel, a pawl pivotally secured to the arm, means to press the pawl toward the shaft, at its front end; a pressure-bar, a back end for the pawl having means for the engagement of the pressure-bar to force the back end of

the pawl toward the shaft and at the same time move the bar end to one side, substantially as set forth.

11. In a return mechanism, a record, a locking-lever, a lifter designed to elevate the lever end, and means to turn the lifter, a spring pressing against the lifter to prevent self-movement, a fulcrum for the lever, a pin inserted in the locking end of the lever, a spring secured in manner to press the pin for engagement, a shaft, a double-ended locking-plate secured to the shaft, having an engaging notch at each end, one notch when disengaged from the locking-lever permitting the rotating of the shaft and the starting of the mechanism, and the playing of the record, and the other notch when engaged by the pin permitting the repeating of the record after the return of the stylus to its first position, substantially as set forth.

12. In a return mechanism, a driven shaft, means thereto connected and thereby driven to rotate a pivotally-supported pawl surrounding a second shaft, a pressure-bar pivotally secured and held at one end in manner to permit the other end to freely move vertically and horizontally, a foundation-plate, a bent part to the pressure-bar, which at the commencement of the record touches the foundation-plate and supports the bar when not engaged, a record, a sound-groove, a stylus, an agitator-arm having means to cause its agitation by the sinuosities of the sound-groove of the record, after the stylus has entered the sound-groove of the record and at which time a part of the agitator-arm enters under, supports and agitates the pressure-bar when not engaging the pawl; a guide-plate through which the pressure-bar end passes, and in which is a guide-opening having an inclined side against which the pressure-bar descends and by which it is guided during the first part of the record-playing, a top to the opening against which the bar is forced when engaged by the pawl, and means upon the pivotal pawl aforesaid to engage the pressure-bar, carry it to and against the top of the guide-opening, remove it to one side, and drop it to the guiding-incline during the first part of the record-playing, or until the agitator-arm has entered under the pressure-bar, when the bar will drop thereon, substantially as specified.

13. In a return mechanism, a record having

a groove, a driven shaft, means thereon and thereto connected to rotate a pivotally-supported pawl, a shaft around which the pawl rotates, a projection secured to the shaft, means to engage the pawl and projection and partially rotate the shaft, the movement taking place when the mechanism is unlocked and free to work, at the commencement of the record; and again at the conclusion of the record; a crank upon the shaft, means connected to, and thereby operated at its first movement, or partial rotating to lower the stylus and its connected mechanism to the record-groove, and upon its second movement or partial rotation to lift the stylus and its connected mechanism from the record and carry them over to the first position above the record side and in place for again being lowered to the record, in manner and action substantially as set forth.

14. In a return mechanism, a driven record, a stylus and a sound-box, and mechanism to permit them to follow a sound-groove in the record, means to automatically return the sound-box and the stylus to the record side at the conclusion of the record, regardless of the length of the record, and without special adjustment for its termination, and an adjustable stop adapted to abut the mechanism upon its return and prevent the stylus from passing beyond the record, substantially as set forth.

15. In a sound-producing instrument, a record having a sound-groove, means to rotate the record, a stylus to follow the sound-groove, means to unlock the mechanism and start the stylus into the groove, means to permit the stylus and its attached and operative mechanism to continue operative to the end of the groove, regardless of its length, and upon the stylus passing from the groove, at the end of the record, operative means to lift the stylus from the record, return it to the side of the record, and above and out of contact therewith, and lock and stop the mechanism from running, in substantially the manner as set forth.

In testimony whereof we affix our signatures in the presence of two witnesses.

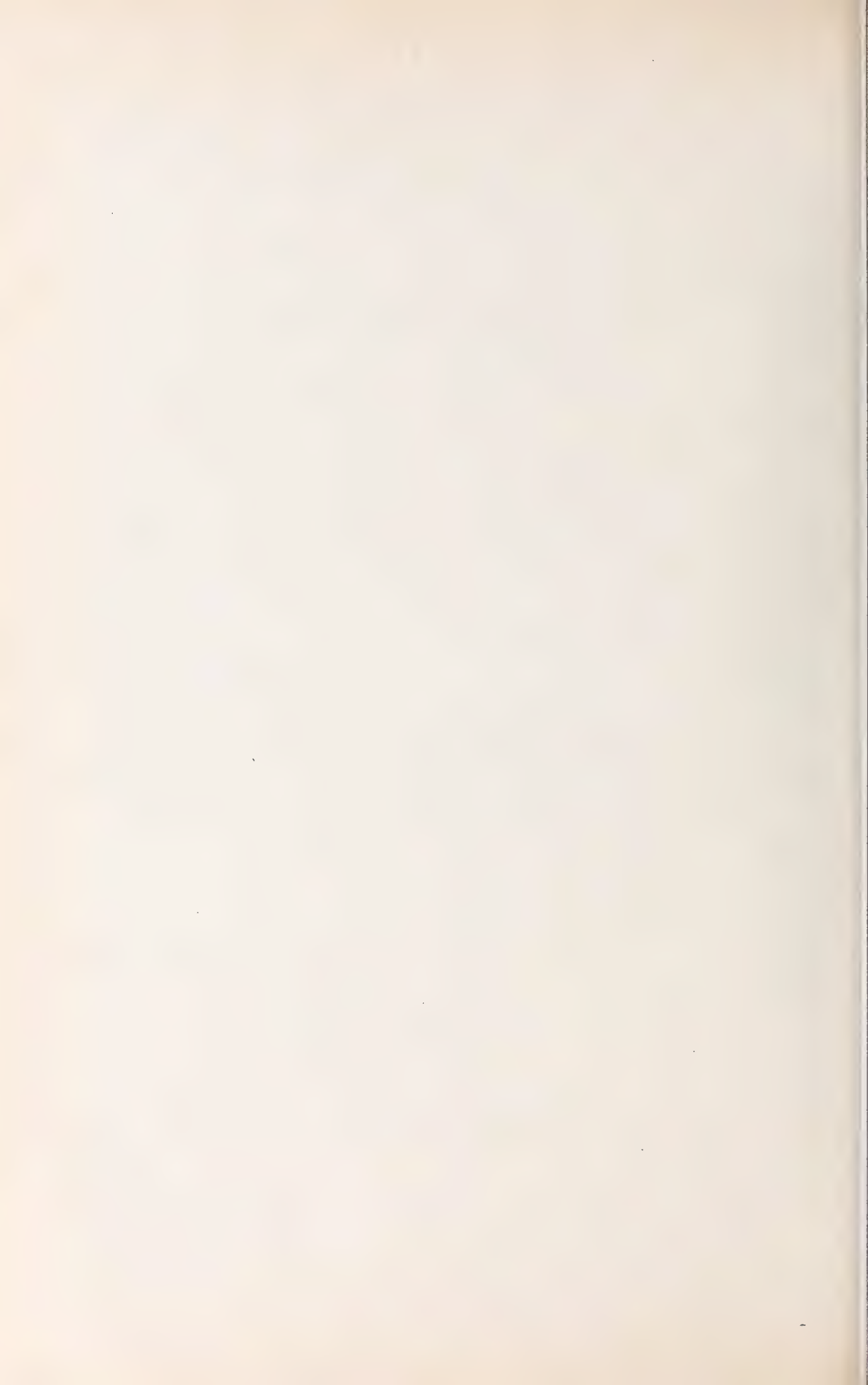
CHARLES C. CLIFFORD.

ALFRED C. CLIFFORD.

Witnesses:

W. H. ALCOCK,

R. C. WRIGHT.



747,834

No. 747,834.

PATENTED DEC. 22, 1903.

G. E. ALLEN.
PHONOGRAPH ATTACHMENT.
APPLICATION FILED MAY 18, 1903.

NO MODEL.

Fig. 1

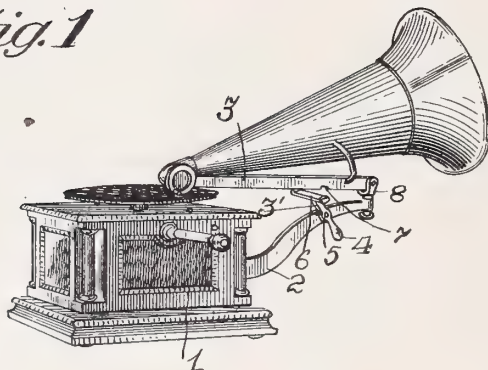


Fig. 2

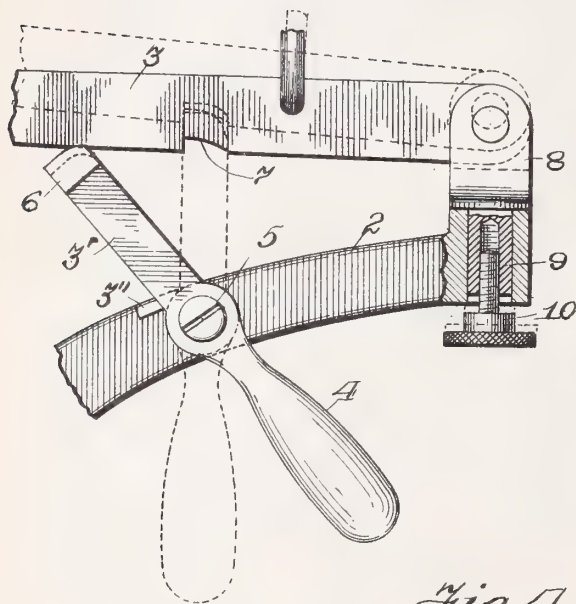


Fig. 3

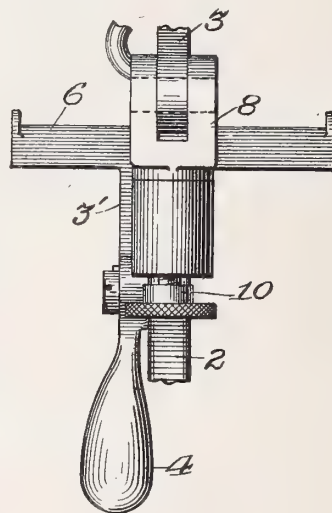
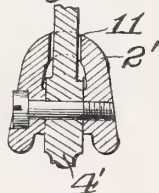


Fig. 4



Witnesses:
Geo. B. Rowley,
C. E. Potter,

Inventor;
G. E. Allen.
By *A. C. Everett & Co.*
Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE E. ALLEN, OF PITTSBURG, PENNSYLVANIA.

PHONOGRAPH ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 747,834, dated December 22, 1903.

Application filed May 18, 1903. Serial No. 157,597. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. ALLEN, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Phonograph Attachments, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in phonograph attachments, and relates more particularly to an attachment for raising the horn of the phonograph on what is known as the "disk type" machine.

The object of this invention is to provide a means whereby when a selection has been completed upon the machine the reproducer and horn may be elevated from said disk without injuring the record and held in their elevated position until such time as it is desired to again lower them.

A still further object of this invention is to provide an attachment wherein the horn may be raised to any height and at any time during the lateral movement of said horn.

In describing the invention in detail reference is had to the accompanying drawings, forming a part of this specification, and wherein like numerals of reference indicate like parts throughout the several views, in which—

Figure 1 is a perspective view of the phonograph, showing my attachment applied thereto. Fig. 2 is a side elevation of my improved device, partly in section. Fig. 3 is an end elevation thereof, and Fig. 4 is a sectional detail view of a modified form of attaching my device.

The phonograph-casing 1 has secured on one side an arm 2, which may be of the usual construction, and to the outer end of which the horn and reproducer-arm 3 are pivotally connected. On this arm 2 I provide a lever 3', having a handle 4 pivotally connected at 5 to the arm 2, and a cross-piece 6 is formed on the part 3 and adapted to engage the lower side of the arm 3 and elevate the same to position, as shown in dotted lines in Fig. 2, when

the device is operated. A notch 7 in the lower side of the arm 3 will when the part 6 is in its elevated position engage the upper side of part 6, thereby preventing its accidental displacement. The pivotal connection between the arms 2 and 3 consists of the clevis 8, in which the arm 3 is pivoted, said clevis having a hollow extension 9 extending into the arm 2, the inside of said extension 9 being screw-threaded and engaged by the thumb-screw 10. (Clearly shown in Fig. 2.) When the handle 4 is actuated, the arm 3 will be elevated; but the pivoted end thereof will only raise the distance which it is permitted to by the adjustment of the screw 10. A stop 3'' limits the movement of the lever 3', as clearly shown in Fig. 2.

In Fig. 4 the arm 2' corresponds with the arm 2, above described, and is hollow in form, and the lever 3 extends through the slot 11, formed therein.

It will be obvious that various changes may be made in the details of construction without departing from the general spirit of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a device of the character described, the combination with a fixed supporting-arm, for a phonograph-horn, a T-shaped elevating member pivotally connected to said arm, a loosely-mounted arm pivoted on said fixed arm, the upper portion of the T-shaped member being adapted to contact therewith, substantially as described.

2. In a device of the character described, the combination of a fixed supporting-arm, a loosely-mounted arm secured thereto, a T-shaped elevating member pivotally connected to the fixed arm of the phonograph-horn support, a stop secured to said arm to limit the movement of said member, the upper part of said member being adapted to contact with the lower edge of the movable member of the horn or support and elevate the same, a pivotal connection between said fixed and movable members whereby the vertical movement of said movable member may be

adjusted, and a notch formed on the under side of said movable member adapted to be engaged by the elevating member, substantially as described.

5 3. In a device of the character described, the combination with a fixed supporting-arm, and a loosely-mounted arm secured thereto, of an elevating member adapted to be pivot-

ally attached to the said fixed arm, substantially as described. 10

In testimony whereof I affix my signature in the presence of two witnesses.

GEORGE E. ALLEN.

Witnesses:

E. E. POTTER,

H. H. BUTLER.

747991

No. 747,991.

PATENTED DEC. 29, 1903.

T. H. MACDONALD.
SOUND REPRODUCER.

APPLICATION FILED APR. 17, 1903.

NO MODEL.

Fig. 1.

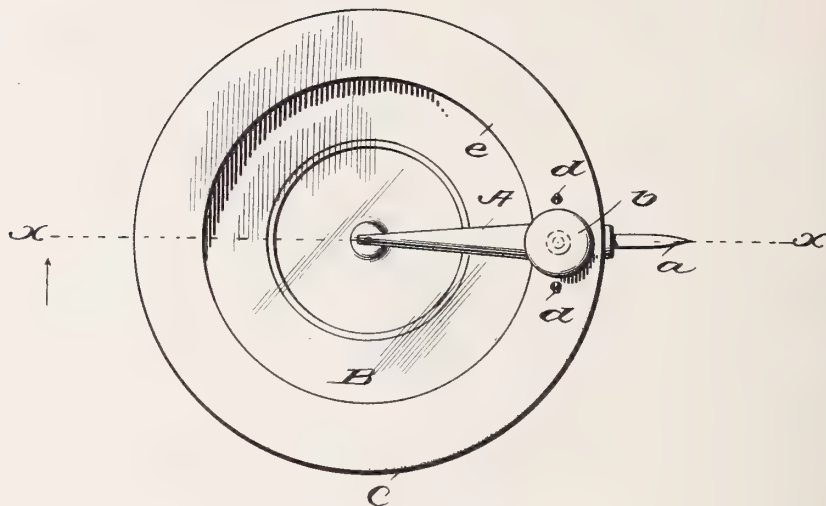


Fig. 2.

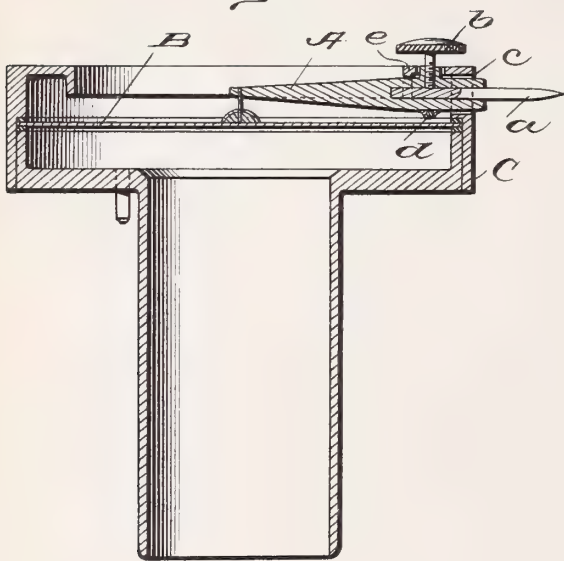
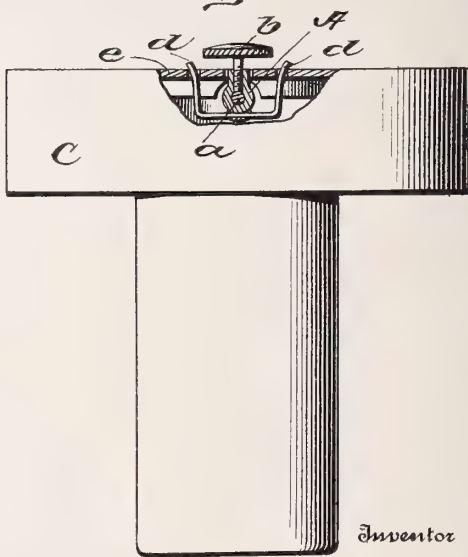


Fig. 3.



Inventor

Witnesses

Gustave R. Thompson,
Jas. B. Kerkane

Thomas H. Macdonald,

By Mauro, Cameron & Lewis,
Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO
AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF
COLUMBIA, A CORPORATION OF WEST VIRGINIA.

SOUND-REPRODUCER.

SPECIFICATION forming part of Letters Patent No. 747,991, dated December 29, 1903.

Application filed April 17, 1903. Serial No. 153,144. (No model.)

To all whom it may concern:

Be it known that I, THOMAS H. MACDON-
ALD, a resident of Bridgeport, Connecticut,
have invented new and useful Improvements
5 in Sound-Reproducers, which invention is
fully set forth in the following specification.

This invention relates to the construction
of sound-reproducers for use with laterally-
undulating sound-records; and its object is
10 to produce a sound-reproducer of simple and
economical construction.

The improvement relates particularly to the
mounting of the stylus-carrying bar or lever,
which is usually attached by means of a spring
15 to the diaphragm-box, the resiliency of the
spring permitting limited vibration of the
bar. According to this invention the bar is
loosely mounted, preferably passing through
a hole in the casing of such size that it does
20 not touch the same in operation. To the
stylus-bar is rigidly fastened a guide rod or
wire, preferably in the form of a staple, whose
ends are fitted and play with slight friction
in holes drilled therefor in the casing. This
25 construction avoids the use of springs, and
the parts can be very cheaply and quickly
made and assembled.

In the accompanying drawings, Figure 1 is
a front elevation; Fig. 2, a section lengthwise
30 of the stylus-bar, and Fig. 3 a part section
transverse to the latter.

The stylus-bar A is attached at one end to
the diaphragm B in any suitable way and at

the other has a socket for reception of the
stylus or needle *a*, which is held in place by 35
set-screw *b*. Bar A passes through a hole *c*
in diaphragm box or casing C, the hole being
of such size that the bar A does not touch
the casing. To the bar A is attached a guide
d, consisting, as shown, of a piece of wire 40
bent to U shape, the ends of the guide being
inserted in holes drilled in flange *e* of the
casing C, in which they fit snugly so as to
play with slight friction. Obviously the
45 guide-wire could be fastened to the casing
and fit loosely in the bar, this being simply
a reversal of the construction.

I claim—

1. In a sound-reproducer, a stylus-bar pass-
ing freely without contact through an aper- 50
ture in the casing, and having a guide rod or
wire attached to said bar and playing freely
with slight friction in a hole in said casing.

2. In combination with the diaphragm and
its casing, a stylus-bar attached at one end 55
to said diaphragm, and a U-shaped guide se-
cured to said bar, its ends playing loosely in
holes in said casing.

In testimony whereof I have signed this
specification in the presence of two subscrib- 60
ing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
M. A. FOGO.

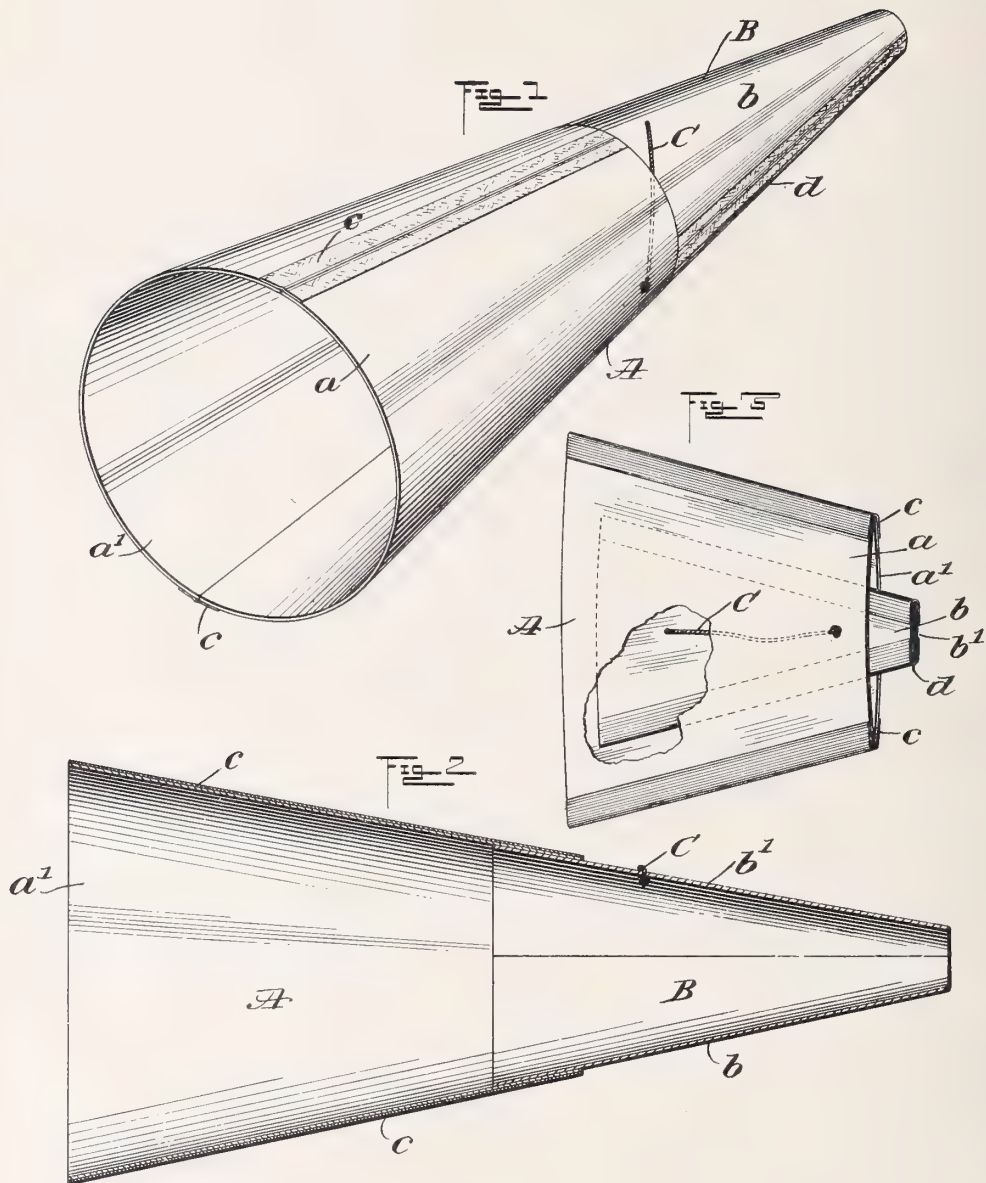
No. 748,969.

PATENTED JAN. 5, 1904.

C. MELVILLE.
MEGAPHONE.

APPLICATION FILED JULY 24, 1903.

NO MODEL.



WITNESSES:

Geo. L. Cheney
W. J. Benkhof

INVENTOR

Colin Melville

BY

Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

COLIN MELVILLE, OF NEW YORK, N. Y.

MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 748,969, dated January 5, 1904.

Application filed July 24, 1903. Serial No. 166,828. (No model.)

To all whom it may concern:

Be it known that I, COLIN MELVILLE, a citizen of the United States, and a resident of the city of New York, (City Island, borough of the Bronx,) in the county and State of New York, have invented a new and Improved Megaphone, of which the following is a full, clear, and exact description.

My invention relates to improvements in megaphones; and the object that I have in view is to produce a collapsible article which may be folded compactly to facilitate storage and transportation and at the same time may be easily and quickly adjusted in a way which prevents collapsing of its parts, so that the device can be used like an ordinary rigid megaphone.

Further objects and advantages of the invention will appear in the course of the subjoined description and the novelty will be defined by the annexed claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of my collapsible megaphone, showing the sections thereof adjusted in position for service. Fig. 2 is a longitudinal sectional elevation through the megaphone in the position shown by Fig. 1; and Fig. 3 is a plan view, partly broken away, showing the sections of the megaphone adjusted one within the other and collapsed or folded compactly for storage and transportation.

As shown by the drawings, the megaphone consists of a plurality of sections, as A B, which are of collapsible construction in order that the section B may fold compactly within the section A. (See Fig. 3.) The section A consists of two members or pieces *a a'*, which are united at their edges by pliable bindings *c*, whereby the parts *a a'* are permitted to fold laterally into a flat condition. The other section, B, consists of parts or members *bb'*, united by pliable bindings *d*, so that the section B may fold laterally into a compact form, as shown by Fig. 3. The sections A B are of conical or tapered form, and the section B is smaller than the section A, in which it is adapted to fit telescopically, as shown by Fig. 2.

Each section may have its parts made of heavy cardboard, linoleum, leather, or any similar material, and the parts of each section are held together by bindings *c* or *d*, of fabric or suitable material. Each section has a tendency to collapse or fold, and the section B is adapted to slide within the section A when it is desired to pack or carry the article. The displacement or relative movement of the sections is limited by the employment of a pliable connection, which is represented in the drawings in the form of a cord, tape, or the like at C. One end of this limiting cord or tape is attached to the section B, while its other end is fastened to the section A in a suitable way, and this limiting-cord is of such length as to permit the section B to have an endwise and turning movement within the section A.

Assuming that the article is in its collapsed condition, as in Fig. 3, the section B is drawn outward and given a quarter-turn in order to bring its joints in a position at right angles to the joints of the sections A, the cord C limiting the movement of the sections relatively to one another. The turning movement of the section B is advantageous, because it brings the two sections into such positions that the tendency of one to collapse is counteracted by the other section, whereby the sections are held in their proper positions when it is desired to use the article in the ordinary way. To fold the megaphone, the sections (or one of them) are turned so as to bring the joints into the same plane, whereupon the sections are free to collapse, and the section B can be slid into the section A within the limit of the length of the cord or tape C.

I do not desire to strictly confine myself to the employment of any particular number of sections nor to the described means for limiting the relative movement of the sections nor to any particular material for making the sections, because these details may be varied within wide limits by a skilled constructor.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A megaphone consisting of collapsible

sections foldable one within the other and fitted telescopically together.

2. In a megaphone, a tapering member formed of sections of resilient material hinged
5 together longitudinally at diametrically opposite sides, and means for holding said tapering member in circular form, said sections being adapted to normally fold into flat engagement with each other when released from
10 said holding means.

3. A megaphone consisting of a plurality of tapering members each formed of sections longitudinally hinged together, each member being collapsible, and one member being
15 turnable with respect to the other, whereby the tendency of the members to collapse is counteracted by the engagement of one member with the other.

4. A megaphone consisting of tapering telescopic sections each being provided with diametrically opposite longitudinal joints and

collapsible, one section being turnable with respect to the other.

5. A megaphone consisting of tapering sections hinged together longitudinally to fold
25 one upon the other, the sections being fitted telescopically one to the other, and means for limiting the relative movement of said sections.

6. A megaphone, consisting of tapering telescopic sections, each formed of two pieces of resilient material provided with longitudinal hinges diametrically opposite each other, the hinges of two adjoining sections being in
30 planes at right angles to each other.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

COLIN MELVILLE.

Witnesses:

J. P. DAVIS,

JNO. M. RITTER.

No. 749,030.

PATENTED JAN. 5, 1904.

T. A. & J. B. CONNOLLY.

SOUND REPRODUCING RECORD AND METHOD OF MAKING SAME.

APPLICATION FILED SEPT. 12, 1903.

NO MODEL.

Fig. 1

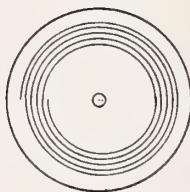


Fig. 2

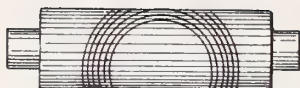
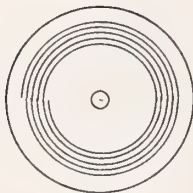


Fig. 3



Thomas A. Connolly
Joseph B. Connolly

INVENTORS

WITNESSES

Thomas V. Sullivan
W. E. Wright

UNITED STATES PATENT OFFICE.

THOMAS A. CONNOLLY AND JOSEPH B. CONNOLLY, OF WASHINGTON,
DISTRICT OF COLUMBIA.

SOUND-REPRODUCING RECORD AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 749,030, dated January 5, 1904.

Application filed September 12, 1903. Serial No. 172,972. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. CONNOLLY and JOSEPH B. CONNOLLY, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Sound-Reproducing Records; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has relation to records for sound-reproducing machines and to methods of making said records, and has for its object the reproduction of a tablet-record having the sound-reproducing groove impressed, indented, or milled in its surface by means of a roller or mill having formed on its surface a sound-record in cameo or relief. In producing said milled record we proceed as follows: A master plate or die of hard metal is first formed by suitably etching a volute record traced through an etching-ground by means of the stylus of a sound-recording instrument. From said master plate or die a roller or mill is then produced by rolling a cylinder or segment of softer metal upon the master-plate under such pressure as will produce upon said roller or mill a counterpart in cameo or relief of the original record. This roller or mill is then hardened or tempered and rolled upon the surface of a plate of softer metal, so as to indent or mill the surface of the latter and produce a milled facsimile of the record of the master plate or die.

In the accompanying drawings, Figure 1 is a plan view of the etched master plate or die. Fig. 2 is a side view of the roller or mill, and Fig. 3 is plan view of a milled sound-reproducing record.

In carrying our invention into effect we use as the preferable material for the master plate or die hardened steel, and the steel may be hardened or tempered either before or after the record has been etched thereon. The master-plate is prepared for etching by having its surface smoothly finished and, if desirable, polished or burnished and then thinly coated with a suitable etching-ground in which a volute record is traced by the stylus

of a sound-recording machine. The etching is then effected by means of a suitable etching fluid and the plate cleaned off. The etched record line or groove so produced will be of substantially even depth throughout, but laterally undulating. A cylinder or roller of soft steel is then rolled on the etched plate under sufficiently heavy pressure in a suitable press to cause the surface of the roller to take up in relief or cameo a transfer of the record from the master-plate, and thus become a "mill." The roller or mill is then hardened or tempered and rolled over a metal plate under sufficient pressure in a suitable press to indent, impress, or mill on or into the surface of said plate an intaglio facsimile of the original etched record-groove. The plate so milled by the action of the cylindrical roller or mill as above described constitutes the sound-reproducing record for sound-reproducing machines and may be hardened or tempered to increase its durability and impart to it other desirable characteristics, and it may be plated or otherwise treated to prevent corrosion.

Instead of using steel for the master plate or die, the roller or mill, and the sound-reproducing plate or record the master-plate may be made of steel or other hard metal, the roller or mill of a softer metal than the master plate or die, such as copper or nickel, and the sound-reproducing record-tablet of a still softer material than the roller or mill, such as tin or aluminium or a suitable non-metallic material. If necessary or desirable, the surface of the roller or mill may be buffed or polished after receiving the record in cameo or relief without impairing its accuracy.

A large number of sound-reproducing records may be produced from a single roller or mill, and many rollers or mills may be produced from a single master plate or die.

Records according to our invention can be produced with great facility and at comparatively low cost. When made of hardened steel, they cause less wearing-friction on the stylus and walls of the grooves than occurs with records made of other materials. The record-grooves are more even and accurate than those formed in soft plastic material, and

owing to the unyielding character of the material the tone-qualities are more pronounced and true.

5 Having described our invention, we claim and desire to secure by Letters Patent—

1. A sound-record consisting of a disk having a volute record-groove milled in its surface.
- 10 2. A duplicate or copy of a sound-record, consisting of a disk of metal having a volute sound-record groove impressed in its surface at normal temperature.
3. A flat metallic record-tablet for sound-reproducing machines having a continuous

volute rolled or milled sound-reproducing 15 groove.

4. A record-tablet for sound-reproducing machines consisting of a plate of metal formed with a volute milled or rolled sound-reproducing groove and hardened or tempered. 20

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS A. CONNOLLY.
JOSEPH B. CONNOLLY.

Witnesses:

THOMAS V. SULLIVAN,
W. E. WRIGHT.

1897

No. 749,092.

PATENTED JAN. 5, 1904.

A. N. PETIT.
DOUBLE FACED SOUND RECORD.

APPLICATION FILED JAN. 7, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

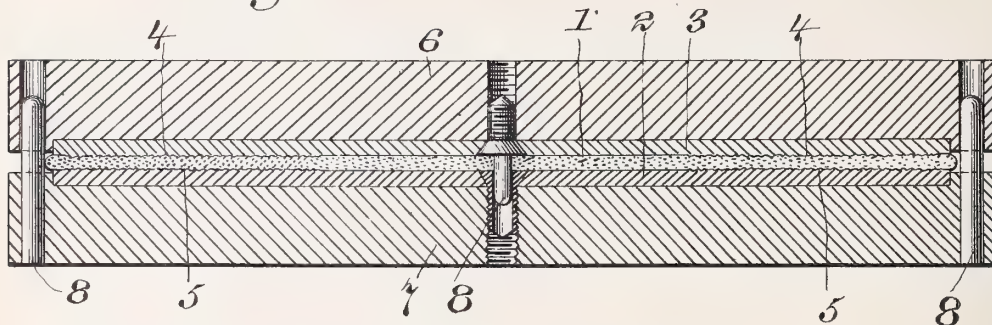
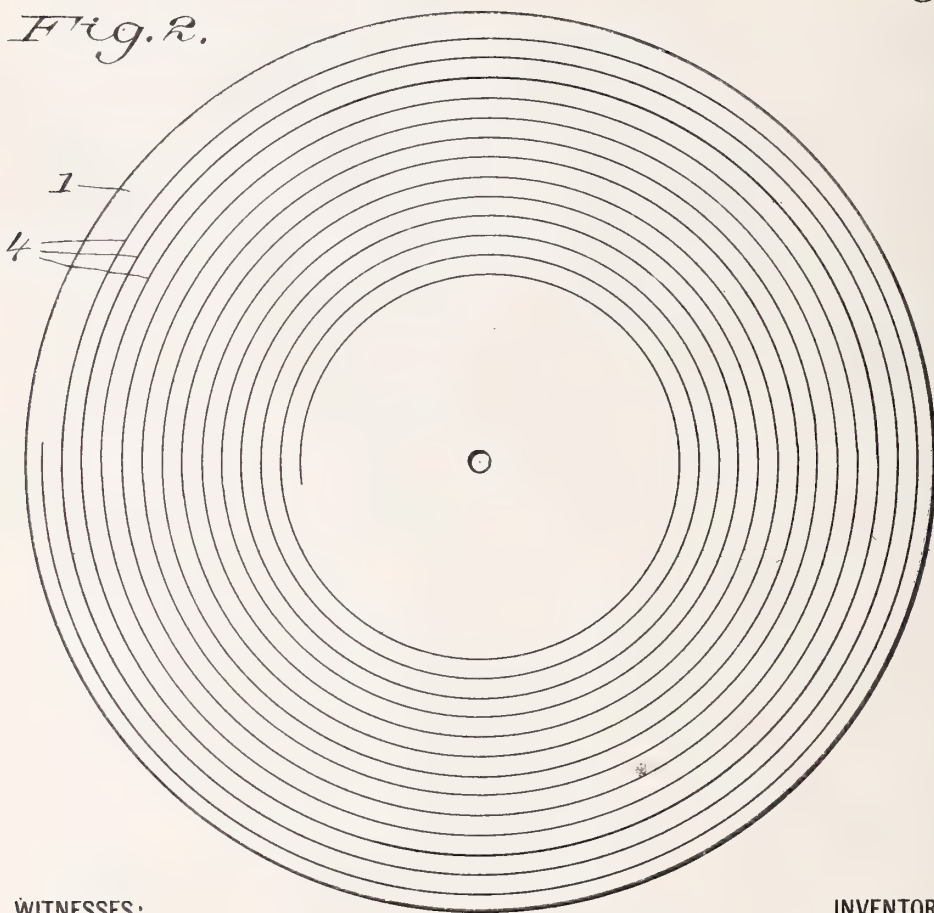


Fig. 2.



WITNESSES:

R. Gerbrach
W. H. Humphrey

INVENTOR

Adeline N. Petit
BY *A. H. Smith*
ATTORNEY

No. 749,092.

PATENTED JAN. 5, 1904.

A. N. PETIT.
DOUBLE FACED SOUND RECORD.

APPLICATION FILED JAN. 7, 1901.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 3.

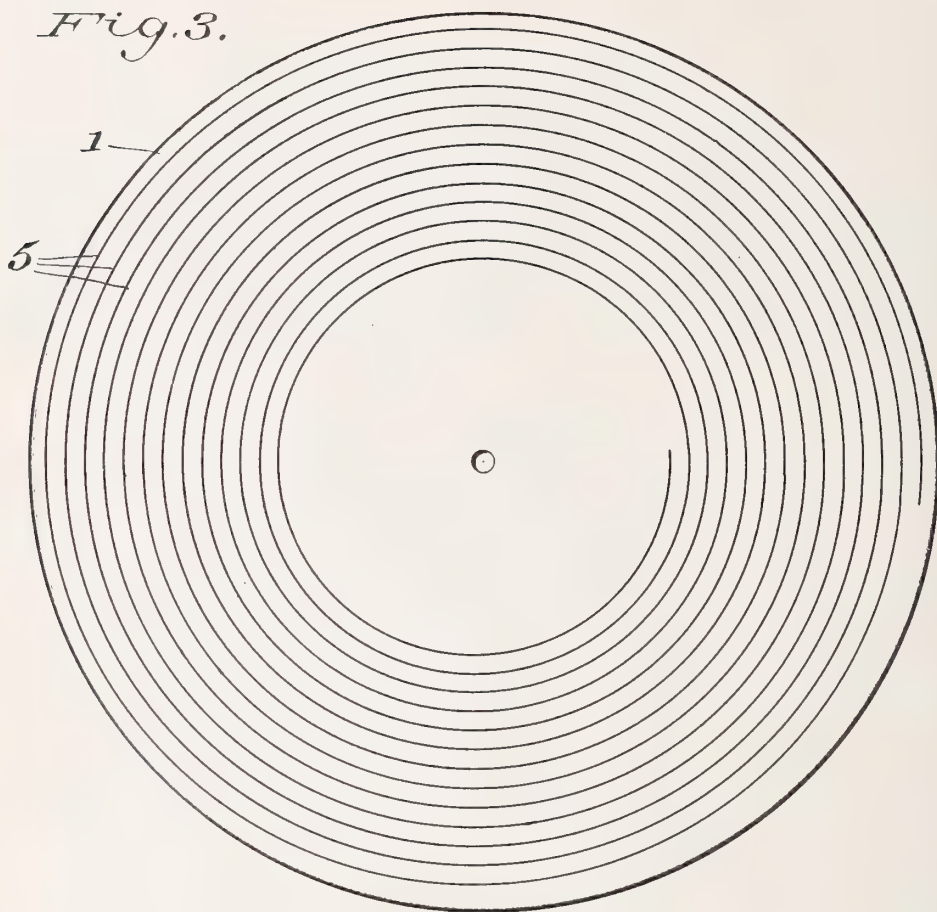


Fig. 4.



WITNESSES:

R. Gerbracht, Jr.
W. H. Humphrey,

INVENTOR

Ademon N. Petit
BY *A. H. Smith*
ATTORNEY

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-HALF
TO F. M. PRESCOTT, OF NEW YORK, N. Y.

DOUBLE-FACED SOUND-RECORD.

SPECIFICATION forming part of Letters Patent No. 749,092, dated January 5, 1904.

Application filed January 7, 1901. Serial No. 42,337. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR NAPOLEON PETIT, a citizen of the United States of America, and a resident of Newark, State of New Jersey, have invented certain new and useful Improvements in Double-Faced Sound-Records, of which the following is a specification.

My invention relates to talking-machines, and aims to provide a novel and improved sound-record disk of the type in which the sound-record is impressed in the form of a spiral groove which receives and directs the reproducing-stylus of the talking-machine. Prior to my invention disks of this character have generally been made from a material resembling hard rubber or vulcanite and of which shellac is usually an important element. A mass of this material rendered plastic by heat has been placed on a flat smooth table or platen and there subjected to heavy compression under a matrix upon which the desired sound-record is reproduced in relief. This matrix flattens out the plastic material into flat disk form and leaves its impress therein in the form of a spiral groove which is the counterpart of the relief portion or portions of the matrix. It has been found in practice that the radial flow or spread of the plastic material under compression between the smooth-faced table or platen and the roughened matrix is unequal, the flow or spread being more pronounced next the table or platen because of the absence thereof of any roughness or relief portions to resist it. The relief portions of the matrix act as so many bars of resistance to retard or prevent radial flow or spread of the material adjacent thereto. While this unequal flow of plastic material at opposite faces of the disk necessarily results in a disturbed molecular structure which impairs the quality of the sound reproduced therefrom, probably the most serious consequence of this unequal flow is the failure of the plastic material to be pressed into intimate contact with all the surface or surfaces of the matrix. This will readily be appreciated when it is considered that the material under compression tends to follow the lines or planes of least resistance, and if it can spread over the flat smooth-faced platen

or table more easily than it can be pressed into the recesses or grooves between and adjacent the relief portions of the matrix then the impress of the latter will be more or less imperfect. In practice it has been found that a considerable percentage of disks are rejected because of imperfect pressing, particularly in the vicinities of the peripheries of the disks, due to the fact that near the peripheries the plastic material oozes out from beneath the matrix much more readily than it will penetrate into intimate contact with and behind the relief portions of the matrix.

My invention comprehends employing two opposing matrices between which the mass of plastic material is compressed under heavy pressure, thereby to produce a double-record-faced disk. The sound-record at either face of such a disk is superior in quality and perfection to that of the single record of a single-record-faced disk made as heretofore, because the presence of the opposing matrices with their roughened or relief surfaces resists radial flow or spread of material equally at both faces of the disk, thus not only reducing the flow, but insuring uniformity at both faces of the disk of whatever flow there may be. Thus the molecular structure is much less disturbed than by the prior method, and, what is more important, the resistance to flow thus obtained at opposite faces of the disk causes the plastic material to be pressed more completely and uniformly into intimate contact with the entire surfaces of both matrices than has heretofore been possible where a single-sound-record matrix only has been used. Thus each of the two records which may be obtained in a single disk in this manner is superior to records heretofore obtained by employing a single matrix producing a single-record face only upon a disk. The opposite records which may be thus obtained in opposite faces of each single disk are necessarily phonetically uniform, since they are impressed simultaneously under similar conditions in one and the same mass of material, making it possible successfully to have one record at one face of a disk, a continuation of another record at the opposite face of the disk, the two to be reproduced in succession as for the rendition of a more extended com-

position than can be recorded upon a single face of the disk without any phonetic difference between the two. This has been found quite impracticable heretofore where single-record-faced disks alone have been used because of the lack of phonetic uniformity in records necessarily produced at different times under different conditions.

The preferred form of my invention and one form of apparatus for producing the same are illustrated in the accompanying two sheets of drawings, in which—

Figure 1 is a sectional view illustrating the arrangement of matrices, &c., and the manner of impressing the record-grooves upon both faces of the disk by a single operation; Figs. 2 and 3, similar views of the opposite faces of a disk, showing the record-grooves impressed therein, the same being illustrated in diagram and greatly exaggerated in order to clearly represent the special form thereof; and Fig. 4 is a central transverse sectional view of the finished disk.

Throughout the figures of the drawings like reference-figures indicate like parts.

A disk 1, of any suitable material or composition of matter in which the record-groove may be impressed while the material is plastic and which will become sufficiently hard and indestructible when set, is compressed between two matrices or dies. I prefer to employ a composition resembling hard rubber or vulcanite, of which shellac usually is an important element and which while quite dense or hard when cold or set may be rendered sufficiently plastic for working by the application of heat thereto. Each of these matrices has preferably a spiral line in relief on its face, which forms a corresponding groove in the disk. Thus the disk is formed with one sound-record groove in one face and another sound-record groove in the other. Both these spirals preferably run from circumference to center of the disk and run in opposite directions in the disk, so that when the disk is turned over or reversed the sound reproduction will result from rotation of the disk in the same direction—say from left to right, as one looks down upon the talking-machine. While it is obviously commercially preferable to have the grooves at both faces of the disk in the form of sound-record grooves, and thus available for sound reproduction, obviously the improved quality of sound-record grooves which results from my invention is essentially the same whether the impression or impressions in the opposite disk-face is or are sound record or records. For example, the groove marked 5 may not be a sound-record, yet its effect upon the quality of the opposite record-face would be essentially the same as if it were a sound-record.

Of course various arrangements of apparatus and detailed methods of procedure may be employed in producing the novel article of manufacture which embodies my inven-

tion. In Fig. 1 I have have shown two matrices, which are usually electrotypes, carried by heavy plates 6 and 7, which are provided with dowel-pins 8 8 and corresponding recesses to act as guides. These plates may be placed in a hydraulic or other powerful press, and by the pressure thus given to them the spiral grooves are impressed in the contained plastic disk 1, of suitable material, which then sets in cooling, the setting taking place mainly while the disk still remains between the matrices. As the material is reduced to thin disk-like form during the compression, if its cooling or setting were not properly controlled it would be likely to set partially before the full impress had been made therein. Hence it is customary to maintain the matrices more or less heated during the compression, so as to prevent too rapid setting of the material, the heat, however, being insufficient to retain the material in plastic condition.

The advantages of my invention are obvious. The semiplastic material being held between two roughened matrices, the tendency to flow from center to circumference under the great pressure used in impressing is resisted and a record-disk of greater density is produced. The material is also thinnest at that part of the disk in which the record groove or grooves are formed, the under surface of the disk being indented opposite the record-groove on the upper surface. This greater density means that the molecules have been forced closer together. This reduces the scraping or hissing sound which usually accompanies sound reproduction in a talking-machine. This scraping or hissing or series of sounds like small explosions are produced by the stylus jumping across the minute spaces between the molecules. The noise is therefore reduced when the molecules are arranged more closely together. The roughened or relief faces of the opposing matrices reduce and at the same time equalize the flow or spread of material at opposite faces of the disk and enforce a more perfect and intimate contact thereof with every essential part of each matrix-surface than has heretofore been possible, so that the plastic material after having been compressed and impressed sets initially in a condition which produces an exact counterpart of each matrix opposed thereto. When the under groove is also a sound-record, two records can be impressed at the same cost for material and labor as heretofore required for one. Comparative renditions of the same musical or other composition may be conveniently associated for reproduction. Thus the same song—"Annie Laurie," for instance—may be recorded when sung as a solo on one side of the disk and when sung as a quartet on the other. Hamlet's soliloquy as spoken by an English actor might be recorded on one side of the disk, and the same soliloquy as spoken by a French actress might be stamped on the other.

Also any composition too extensive to be recorded upon a single disk-face may be recorded in part upon one such face and in part upon the opposite face with certainty that there will be no disparity or objectionable difference between the renditions of the two parts of the same composition, with absolute certainty of phonetically-uniform results, which has been quite impossible heretofore where the successive renditions are from records successively produced under varying conditions. In this way I am enabled to produce sound-records of increased value as an agency for instruction, amusement, and the perpetuation of interesting comparisons. Another advantage is that the indentations on the under surface of the disk, whether in the form of grooves of any kind or of sound-record grooves or of other form, heighten the frictional adhesion of the disk to the felt with which the rotating table of the machine is usually faced, and thereby decreases the necessity for special clamping means, and so facilitates the use of the record-disk in the reproduction of sounds.

I claim—

1. As a new article of manufacture, a sound-record consisting of a disk of hardened plastic material presenting oppositely-facing, pho-

netically-uniform sound-records impressed into the plastic material and fixed or set therein by the initial setting of the disk.

2. As a new article of manufacture, a disk of homogeneous, hardened, plastic and dense material having a sound-record on both of its opposite faces formed by compressing a body of such material in a plastic condition between opposite templets each of which is roughened by a sound-record.

3. As a new article of manufacture, a sound-record consisting of a disk presenting oppositely-facing sound-records impressed therein.

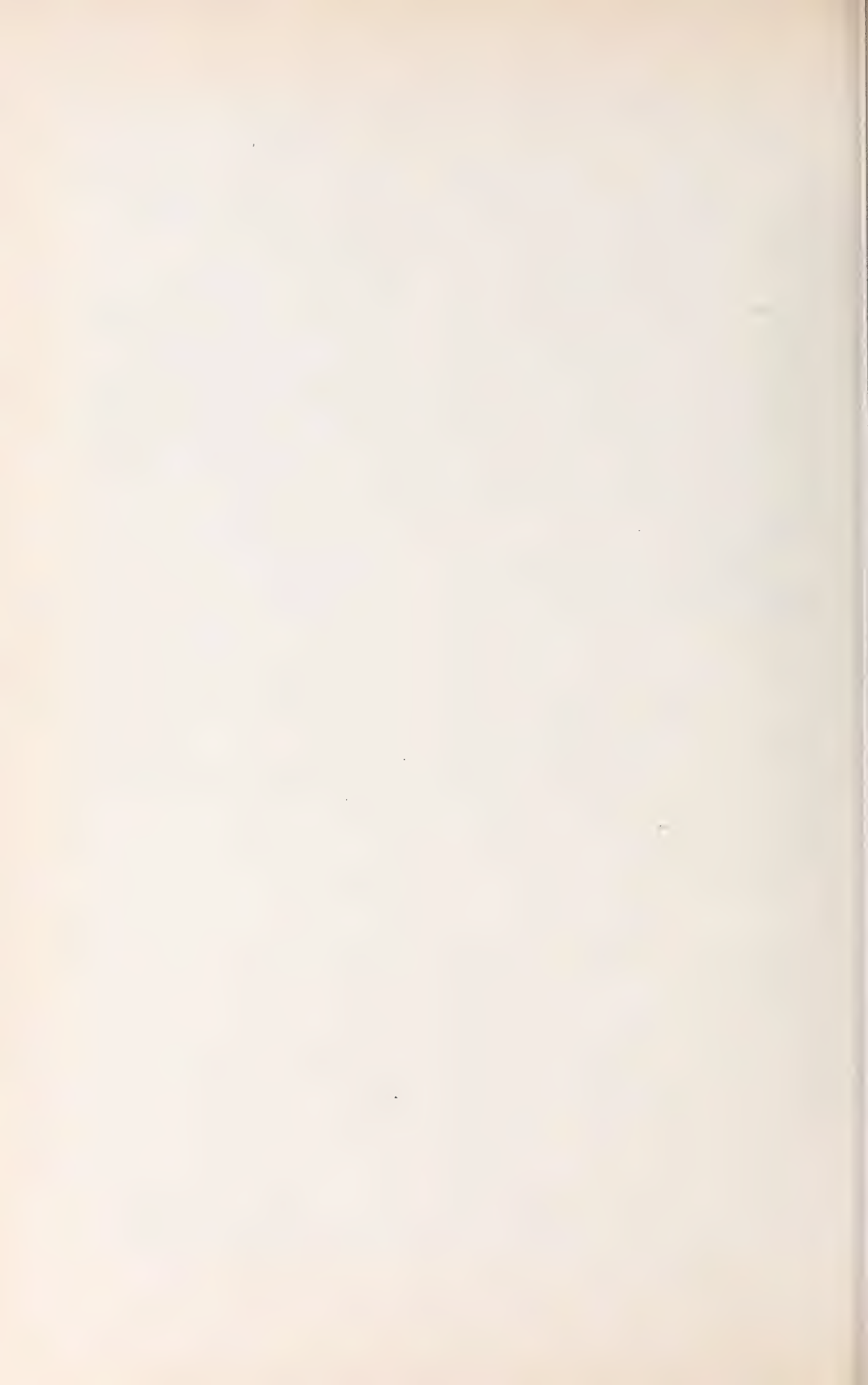
4. The process of making double-faced sound-record disks of uniform phonetic quality on both sides and from center to periphery on each side which consists in compressing a plastic homogeneous mass between two templets each of which is roughened as by having a sound-record formed in relief thereon and thereby causing the radial flow of material in assuming its final shape to be alike at both faces.

Signed at New York, N. Y., this 5th day of January, 1901.

ADEMOR N. PETIT.

Witnesses:

W. H. PUMPHREY,
L. E. PEARSON.



749360

No. 749,360.

PATENTED JAN. 12, 1904.

G. K. CHENEY.

SOUND BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

APPLICATION FILED APR. 16, 1902.

NO MODEL.

Fig. 1.

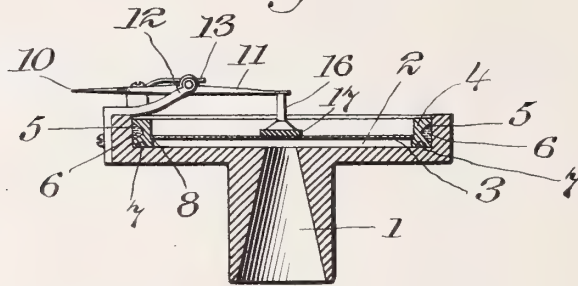


Fig. 2.

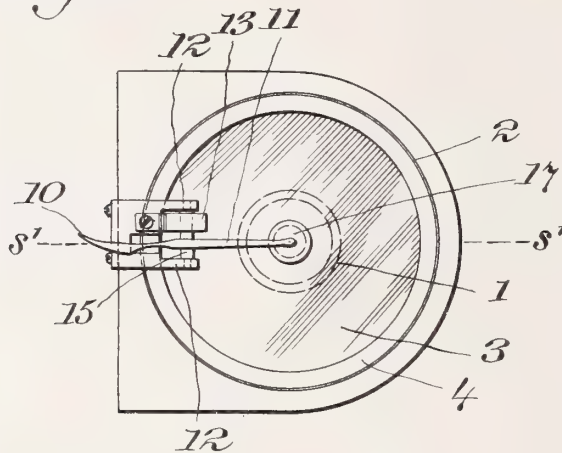


Fig. 3.

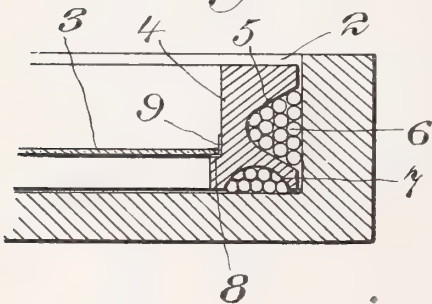
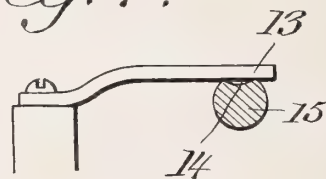


Fig. 4.



WITNESSES:

R. Pearson.
H. H. Humphrey.

INVENTOR

George K. Cheney
BY *R. H. Smith*
ATTORNEY

UNITED STATES PATENT OFFICE.

GEORGE K. CHENEY, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL TALKING MACHINE MANUFACTURING COMPANY, A CORPORATION OF NEW YORK.

SOUND-BOX FOR SOUND RECORDING AND REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 749,360, dated January 12, 1904.

Application filed April 16, 1902. Serial No. 103,154. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. CHENEY, a citizen of the United States of America, and a resident of the city of New York, county of New York, State of New York, have invented certain new and useful Improvements in Sound-Boxes for Sound Recording and Reproducing Machines, of which the following is a specification.

My invention relates to sound recording and reproducing machines, and more specifically to certain improvements in the construction of the sound-box employed therein.

One embodiment of the invention is illustrated in the accompanying sheet of drawings, throughout the several views of which like reference-numerals indicate corresponding parts.

In the drawings, Figure 1 is a sectional view taken on the line $s's'$ of Fig. 2, the stylus and its support being shown in elevation. Fig. 2 is a plan view thereof. Fig. 3 is an enlarged detail sectional view showing the manner of mounting the diaphragm in the sound-box casing, and Fig. 4 is an enlarged detail view of the centering-spring for the stylus-arm.

Referring to the drawings, the sound-box casing is represented as provided in the usual manner with a tubular extension 1 for connection with the horn and a circular chamber 2 for the diaphragm. Within this chamber the diaphragm 3 is mounted in a floating ring 4. The outside diameter of this ring is a trifle less than the diameter of the chamber to provide sufficient clearance to permit a free up-and-down movement of the ring. In order to center the ring and provide an antifriction and noiseless bearing, it is grooved peripherally, as shown at 5, and the groove filled with a heavy liquid—such as oil, glycerin, mercury, or the like—which, as indicated in Fig. 3, serves in a sense as a ball-bearing and holds the ring away from or out of contact with the annular wall of the diaphragm-chamber. If desired, a second groove 7 may be formed on the bottom of the ring and filled with liquid to support it clear of the bottom of the chamber. Within this floating ring an annular shoulder 8 is formed to provide a seat for the diaphragm.

The shoulder is made very slight, so that the diaphragm has only the smallest possible marginal bearing thereon. I preferably secure the diaphragm elastically upon its seat by a coating of wax 9, the diaphragm being placed thereon while the wax is soft and adhesively secured as it hardens.

The recording point or stylus 10, forming a continuation of the stylus-arm 11, is trunnioned in bracketed bearings 12 12 and is free to vibrate under the yielding resistance of a plate-spring 13, which, as shown in Fig. 4, engages a flattened or concaved portion 14 of the needle-arm shaft 15, and thereby serves to maintain the arm in a central position. The stylus-arm may be connected with the diaphragm in any suitable or well-known manner—as, for example, by means of the post 16—and there is preferably interposed between the diaphragm and the arm or post a disk of elastic material 17, such as rubber or the like.

While the sound-box, as above described, is particularly adapted for use in recording, it may be readily converted into a reproducing instrument by substituting for the recording-point shown an ordinary needle or stylus, with means for readily removing and renewing the same. In either recording or reproducing sound the diaphragm is free to vibrate throughout its entire area by reason of its being elastically connected to its seat through the interposed layer or coating of wax, and the full force and effect of the sound-waves is thereby secured. In addition to its ordinary vibratory action the diaphragm may move bodily with its floating-ring support and thereby avoid buckling by more readily adapting itself to cooperate with the needle-arm in receiving and transmitting vibrations. The rubber disk interposed between the stylus-arm and the diaphragm in yielding to the outward vibrations affords greater amplitude of movement of the diaphragm and thereby improves the tone by increasing its clearness and volume.

The operation, &c., will be readily understood from the foregoing description.

I do not wish to limit myself to the exact construction and arrangement of parts herein shown and described, as various changes might be made without departing from the spirit and scope of my invention. For example, other forms of floating diaphragm might be employed and the diaphragm might be differently mounted. The bracketed bearings for the stylus-arm and the form of centering-spring might be changed, &c.; but all such modifications I consider obvious and immaterial variations of form and not of substance and still within the meaning of my invention.

Having therefore described my invention, I claim

1. The combination of a sound-box, a diaphragm, a floating support in which the diaphragm is adhesively secured, said support being freely movable in and confined by the walls of the sound-box and an operatively-connected stylus.

2. The combination of the sound-box, a floating ring therein, provided with an annular seat, a diaphragm, an interposed elastic mate-

rial adhesively securing the diaphragm upon the annular seat and a coöperating stylus.

3. The combination of the sound-box, a floating ring therein, provided with an annular seat, a diaphragm, an interposed elastic material adhesively securing the diaphragm upon the annular seat, the stylus elastically connected with the diaphragm, bearings in which the stylus is mounted to vibrate freely, and a retractile spring for the stylus.

4. The combination of the sound-box, a floating ring therein, provided with an annular seat, a diaphragm, an interposed elastic material adhesively securing the diaphragm upon the annular seat, a coöperating stylus trunnioned in bracketed bearings to vibrate freely, and a spring engaging a flattened portion of one of the trunnions.

Signed at New York city, New York, this 15th day of April, 1902.

GEORGE K. CHENEY.

Witnesses:

W. H. PUMPHREY,
L. E. PEARSON.

797.857.

E. GILMAN
PHONOGRAPH.

APPLICATION FILED FEB. 4, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1

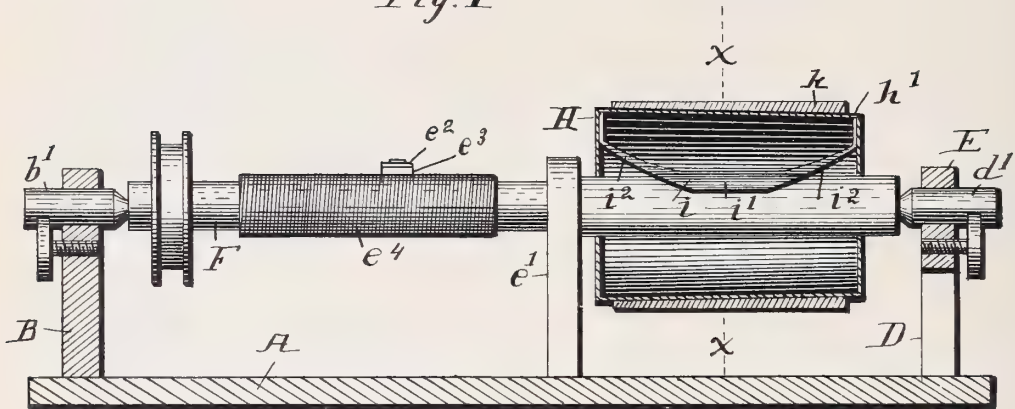


Fig. 2

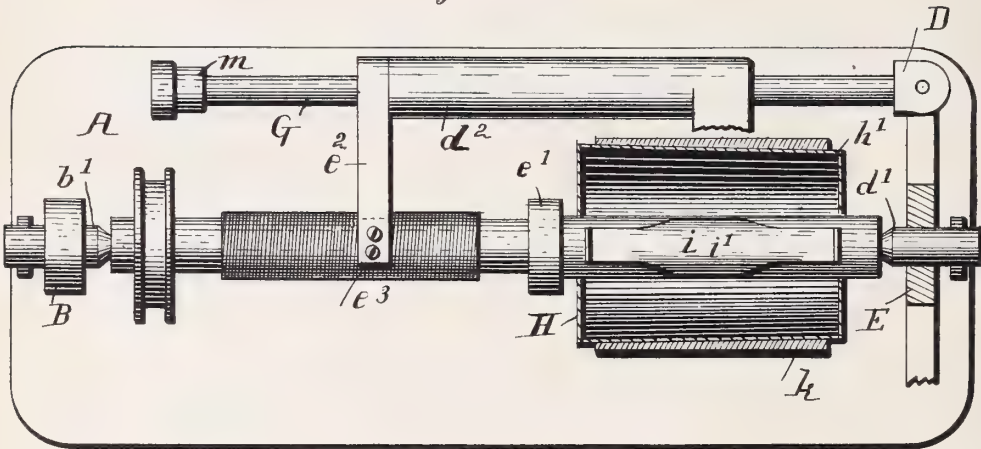
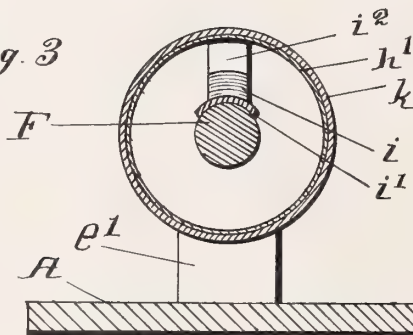


Fig. 3



Witnesses:

Linus Barnes

Willis Barnes

Inventor.

Edward Gilman.

By George L. Barnes

Atty

No. 749,857.

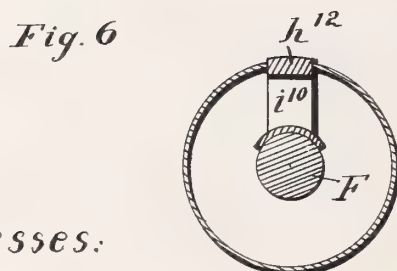
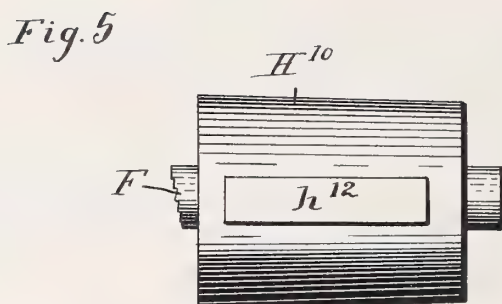
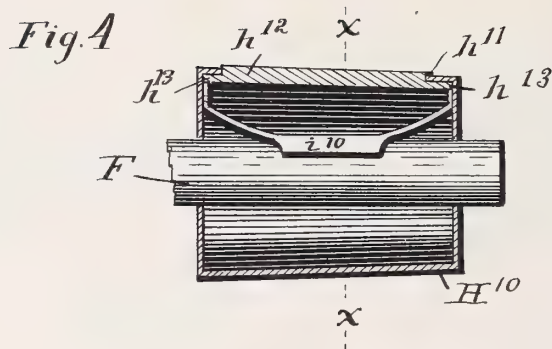
PATENTED JAN. 19, 1904.

E. GILMAN
PHONOGRAPH.

APPLICATION FILED FEB. 4, 1903.

NO MODEL.

2 SHEETS—SHEET 2.



Witnesses:

Linus Barnes
Willis Barnes

Inventor.

Edward Gilman
By George L. Barnes
Atty

UNITED STATES PATENT OFFICE.

EDWARD GILMAN, OF NEW HAVEN, CONNECTICUT.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 749,857, dated January 19, 1904.

Application filed February 4, 1903. Serial No. 141,823. (No model.)

To all whom it may concern:

Be it known that I, EDWARD GILMAN, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State
5 of Connecticut, have invented certain new and useful Improvements in Phonographs, of which the following is a full, clear, and exact specification.

My invention relates to an improvement in
10 phonographs; and it has for its object to provide means for the axial adjustment of the record on its driving-shaft. In phonographs which are fitted with automatic return-carrier or repeating actions it is desirable that the
15 cylinder or drum which carries the record should be capable of lengthwise adjustment on the arbor or shaft which revolves it for the purpose of accommodating or timing the period of phonographic action to the movement of the return-carrier, so as to avoid rotating the record beneath the speaker before the commencement of the piece or after the completion thereof and producing a disagreeable scratching noise or other discordant
20 result.

The invention consists in the novel method of securing the record-cylinder upon the driving-shaft, and particularly in the novel spring-friction holder for clamping the cylinder to the shaft, while permitting free lengthwise
30 movement of the same thereon and the parts of the mechanism, as hereinafter more fully described and claimed.

In the accompanying drawings, forming a
35 part of this specification, Figure 1 is a sectional elevation of a phonograph provided with my improved method of securing the record-cylinder to the driving-shaft. Fig. 2 is a plan view, partly in section, of Fig. 1; and Fig. 3 is a cross-section on the line X X
40 of Fig. 1. Figs. 4, 5, and 6 are substantially similar views of a modification.

Referring to the drawings, A designates the base-plate of the phonograph provided with
45 the fixed standard B, having the center *b'* and the frame D, to which is hinged the gate E, having the center *d'*, which centers, in connection with the intermediate bearing *e'*, support the driving-shaft F.

50 G represents the guide-rod upon which the

reproducer-frame *d''* travels and to which frame is attached the usual arm *e''*, carrying the section of a nut *e'''*, adapted to engage and be driven by the screw-threaded portion *e''* of the driving-shaft. These elements are all old and
55 well known and here require no further description, the improvement comprising my invention being as follows: The hollow drum or cylinder H instead of being rigidly secured on the driving-shaft F is loosely fitted thereon, and a curved spring *i*, extending the entire length of the interior of the cylinder, is interposed between the shaft and the cylinder-shell and adapted to exert spring-pressure and provide frictional engagement between them.
60 The central part *i'* of the spring is curved to fit the shaft, and the ends *i''* are bent upward therefrom and impinge against the outer shell *h'* of the cylinder. The spring is of such width that it can easily be inserted through the hole in the cylinder-head, through which the shaft F passes, and in assembling the parts it is first slipped into the cylinder and the shaft afterward inserted to place. In operation the spring will hold the cylinder upon the shaft with sufficient friction to cause its rotation therewith, but will permit it to be readily moved lengthwise thereon, thereby enabling the record *k*
65 upon the cylinder to be so adjusted with relation to the movement or travel of the repeating mechanism of the phonograph when the machine is provided with such that it will commence playing when the reproducer-frame commences to reverse or stop coincident with the return of the frame, as desired. Excellent results are obtained with this improvement by adjusting the cylinder so that the reproducer-frame will be carried back to the starting-point just at the end of a piece played and timing the commencement by placing a
70 suitable washer *m* upon the guide-rod G to stop the reproducer-frame at the initial point of the piece.

The yield of the cylinder on the shaft as the record is placed upon it also prevents the record from being fractured by crowding it too hard upon the taper surface of the cylinder.

Figs. 4, 5, and 6 are views showing a modification in which the drum H¹⁰ has a longitudinal opening *h''*, extending nearly throughout
100

its length, which receives a block h^{12} , fitted therein and provided with means for preventing its escape outwardly through the opening—as, for instance, the shoulders h^{13} , projecting under the shell at the ends of the opening. The spring i^{10} is arranged to press between the block h^{12} and shaft to force the block outwardly as well as to create friction upon the shaft. The block projects somewhat above the periphery of the shell when at its extreme outward travel and is adapted to yield inwardly as a record is slid upon the drum to adjust and accommodate itself to the base of the same. This makes an expanding mandrel of the drum and insures its holding the records securely, though they vary somewhat in the size of the bore.

I claim and desire to secure by Letters Patent—

In a phonograph the combination of the driving-shaft, the record-cylinder fitted freely thereon, and the frictional clamping-spring i interposed between the shaft and the cylinder-shell, and adapted to be inserted within the cylinder through the shaft bearing or aperture in the head thereof, substantially in the manner and for the purpose specified.

Signed by me at New Haven, Connecticut, this 3d day of January, 1903.

EDWARD GILMAN.

Witnesses:

JENNIE HOLMES,

GEORGE L. BARNES.

No. 750,118.

PATENTED JAN. 19, 1904.

A. N. PETIT.

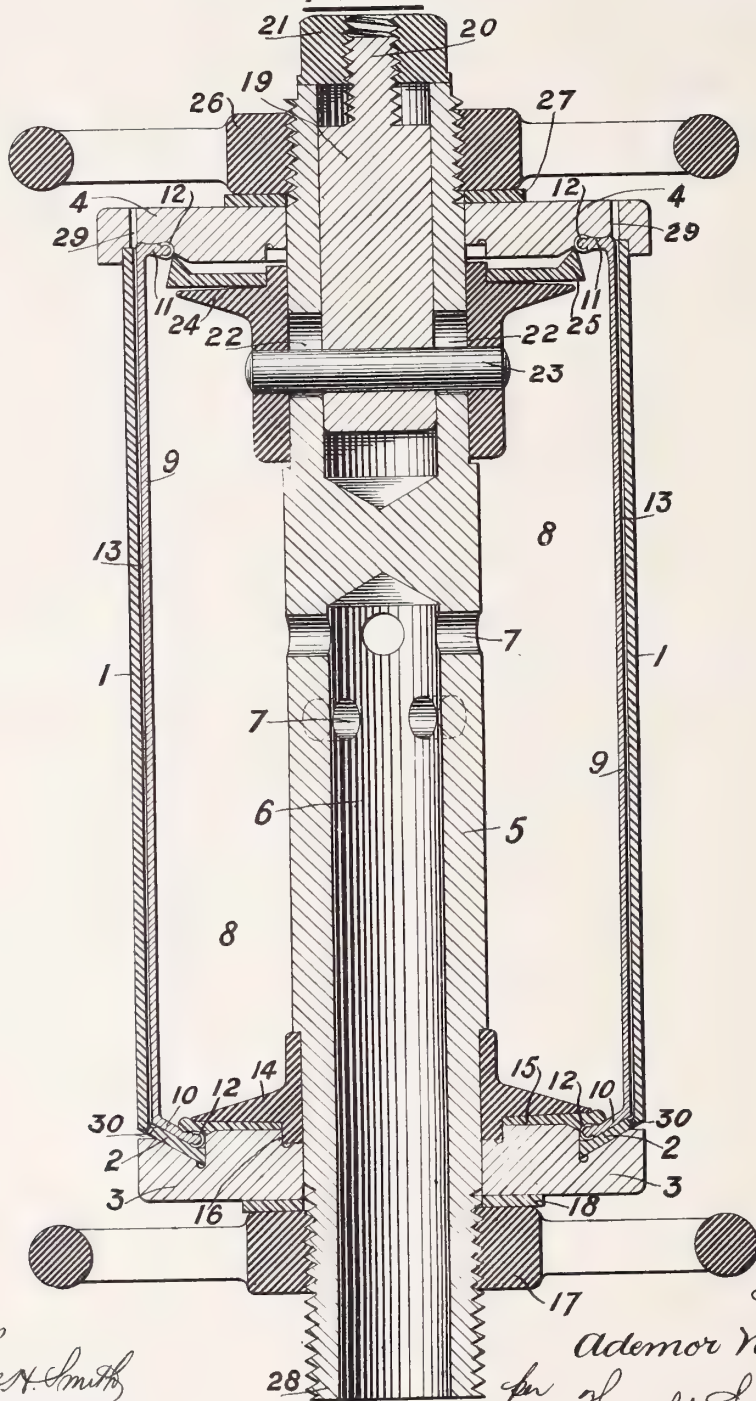
APPARATUS FOR DUPLICATING SOUND RECORD CYLINDERS
OF PHONOGRAPHS, &c.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

—FIG. 1.—



Witnesses

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J. Staib

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Adenor N. Petit

for Harold Serrell

att'y

No. 750,118.

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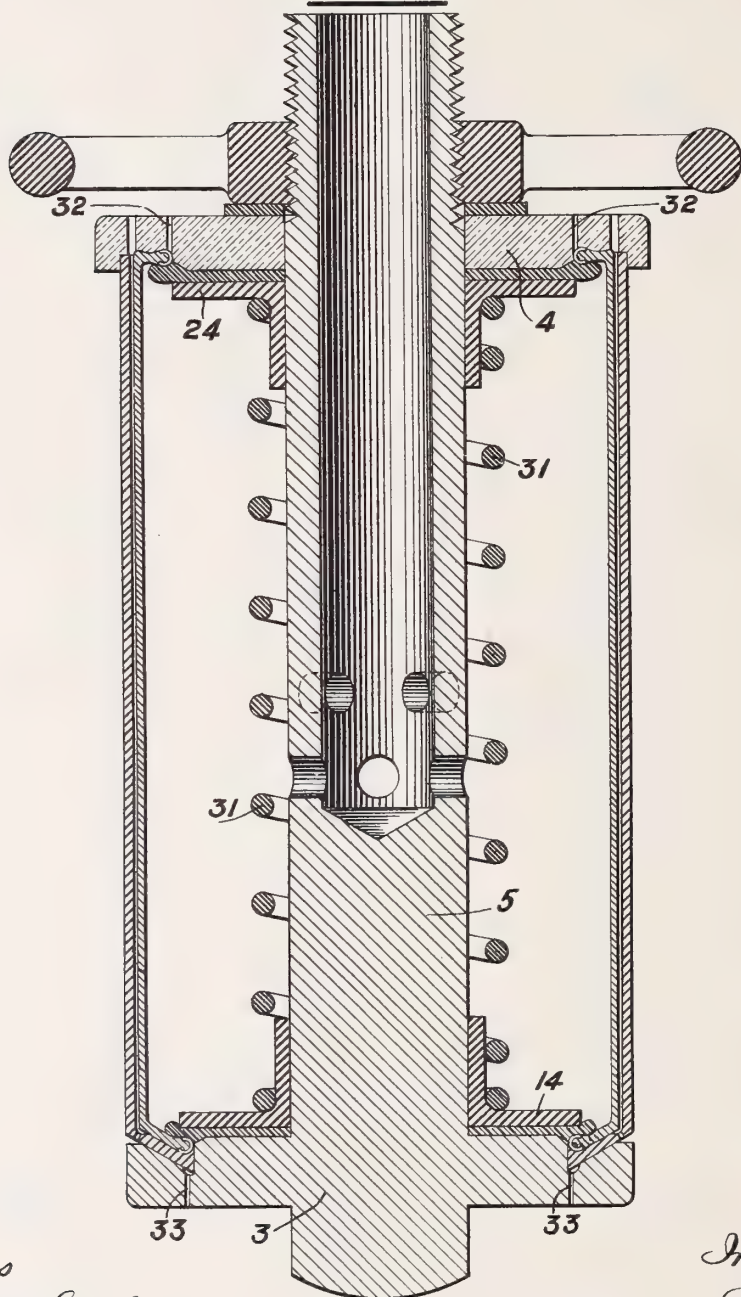
APPARATUS FOR DUPLICATING SOUND RECORD CYLINDERS
OF PHONOGRAPHS, &c.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

—FIG. 2.—



Witnesses

Chas. H. Smith
J. Stair

Inventor

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Atty.

UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF WATERLOO, NEAR LIVERPOOL, ENGLAND.

APPARATUS FOR DUPLICATING SOUND-RECORD CYLINDERS OF PHONOGRAPHS, &c.

SPECIFICATION forming part of Letters Patent No. 750,118, dated January 19, 1904.

Application filed March 25, 1903. Serial No. 149,474. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR NAPOLEON PETIT, a citizen of the United States of America, and a resident of Waterloo, near Liverpool, county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for the Manufacture of Duplicate Sound-Record Cylinders of Phonographs and Similar Machines, of which the following is a specification.

Duplicate sound-record cylinders for phonographs and similar machines have been composed of celluloid, and the indented sound-wave record has been produced upon the exterior cylindrical surfaces of the duplicate record-cylinders by pressing the latter within a matrix. These matrices, as is well known, have been made from original sound-records by galvanoplastic processes, and the blank celluloid cylinders have been then introduced within the matrices and the celluloid cylinders pressed by internal pressure with applied heat into contact with the interior surfaces of the matrices. The celluloid cylinders after becoming cool are extracted, and the required indented curves and markings will have been produced upon the exterior surfaces thereof. Such is the ordinary method of manufacture of the celluloid duplicate record-cylinders, and I have found by practice that to successfully carry out the manufacture of these articles it is essential that the molding device employed must be of substantial character on account of the high pressure necessary to force the record-blank against the matrix, the degree of heat necessary to be applied, and the sudden cooling which the mold has to undergo. At the same time the molding device must be simple in construction and be readily made absolutely air-tight in order to produce a good result at each operation and to produce a clear and perfect impression, while the said molding apparatus must be capable of being easily manipulated by comparatively unskilled labor.

My present invention therefore particularly refers to the improved construction and combination of parts composing a molding device which I have found to be well adapted to meet the requirements of its use and whereby there is provided means for allowing of the gradual escape of air between the exterior surface of

the blank record-cylinder and the interior surface of the matrix and to hermetically seal the ends of the record-blank within the matrix preparatory to the application of interior pressure.

In order that my invention may be readily understood I will describe an exemplification of a construction of my apparatus or device.

Figure 1 is a vertical section of the molding apparatus, and Fig. 2 shows by a similar view a modified construction of the same apparatus.

The matrix is produced, as usual, by the electrolytic deposition of metal upon an original cylinder, which latter is afterward removed, and there is thus produced a cylindrical matrix, such as 1, one end of which has an inwardly-bent flange 2, formed integral with the matrix 1, and this end I will term the "base." The matrix 1 is supported at its base end by a metal base-plate 3 of substantial character, the flanged end 2 of the matrix 1 resting in a recess in the face of this base-plate 3, while the plain end of the matrix (the upper end in the drawings) rests in a recess in the other end plate or, as I will term it, the "top plate" 4, and the base and top plates may be in the form of disks, while centrally through the disks there passes a bolt 5, Fig. 1.

Referring to Fig. 1 of the drawings, the bolt 5 is bored centrally and axially from the lower end to near about the central part of the interior of the matrix, and from this bore 6 ports 7 are formed through the walls of the bolt communicating with the interior space 8 of the matrix, and this bore 6 and these ports 7 serve as passages by which fluid-pressure and heat can be introduced to within the matrix. Such fluid-pressure and heat may consist of hot water or other medium; but I preferably employ steam.

Before the end plates 3 4 are adjusted to position upon the bolt the blank record-cylinder 9, of plastic material, such as celluloid, is inserted, and this blank record-cylinder has inwardly-bent flanges at its ends, one such flange 10 being wider than the other flange 11. The inner peripheries of the flanges may have the metal rings or liners 12 fixed upon them, which permanently and effectively maintain the diameters of the end apertures of the cylinder, such as I have described in my two

patent applications of even date with this, Serial Nos. 149,473 and 149,475.

The wider inturned flange 10 of the record-blank 9, with its ring 12, rests against the inturned end 2 at the base of the matrix, which forms a limit-stop for the record-blank, while the smaller inturned flange 11 and the larger diameter ring 12 at the other end of the record-blank 9 rests against a recess made in the face of its end plate 4. The record-blank cylinder 9 is of such a diameter that it freely enters the matrix-cylinder, and a small space 13 remains between the interior of the matrix and the exterior of the blank.

I have found it to be very useful and convenient to have each record-matrix carry a permanent registration of its title in such a manner as to cause the title to be similarly molded upon the blank record-cylinder in the course of the operation, and then the title so molded on the record-cylinder remains as permanent as the sound registration. To this end the integral inwardly-flanged end of the matrix 2 is useful for the registration of the titles, and to obtain this in a simple manner I shape the original sound-record of the desired form at one end, and there engrave the title. Thus in the production of the matrix the title also is produced in the flanged end 2 upon that inner surface with which the flanged end 10 of the blank 9 will lie in contact. In the same way the name of the manufacturer or a trade-mark, &c., may be produced upon the smaller flanged end 11 of the blank by engraving that portion of the end plate against which that flange is in contact.

In order to form the joints at the ends of the matrix, I proceed as follows: Upon the central bolt 5 and adjacent to the inner face of the base-plate 3 there is fixed a flanged collar 14, and located around a shoulder on this flanged collar and between the inner face of the base-plate 3 and the collar 14 there is a gasket or washer 15, of india-rubber or other suitable material, formed around its periphery, with a thickness or edge to come against the interior face of the inwardly-bent flange 10 of the record-cylinder 9. The inner face of the base-plate 3 is formed with a recess 16 around the bolt 5, which when the end plate 3 is slid along the bolt toward the flanged collar 14 will take over the shoulder on the latter part.

Means are provided exterior of the base-plate 3 to press the latter and traverse it with a sliding motion toward the flanged collar 14, and such means may consist of a wheel-nut 17 or the like screwed onto the projecting end of the bolt 5 and having a suitable washer 18 in between the nut 17 and the base-plate 3, so that by rotating the nut 17 the base-plate will be traversed along the bolt 5 with a sliding action, bringing its inner face against the rubber gasket 15 and causing the enlarged periphery of the rubber gasket 15 to be pressed against the inturned end 10 of the record-blank

9, and so produce an air and steam tight joint. The opposite end of the bolt 5 is bored to receive a slide-plug 19, which is rendered incapable of rotation in that bore and which can be slid in the axial direction of the bolt by means of a screwed end 20 on the plug 19 engaging a nut 21, bearing against the annular end of the bolt 5. There are slots 22 in the walls of the bolt in the interior of the pressure-chamber 8, and a stud 23 passes through the slots 22, through the slide-plug 19, and through the shoulder of a flanged collar 24, located in the pressure-chamber 8, capable of sliding motion upon the bolt 5, and the stud 23, passing through the slots and entering the sliding plug, prevents the latter rotating.

A rubber or other suitable gasket 25 is located on the face of the flanged collar 24, between the top plate 4 and that collar, similar to the rubber gasket before described for the other end of the device.

The top plate 4 is pressed against the end of the matrix 1 by a hand-operated nut 26 on the central bolt, there being a washer 27 located between the nut and the top plate 4 to form a secure joint. When so secured, the sliding plug 19 is drawn outward by revolving the nut 21, which has a bearing on the end of the bolt 5, and thus the flanged collar 24 is traversed with a sliding motion toward the interior of the top plate 4, the rubber gasket is pressed between the inner wall of the top plate, and the flange of the collar and the enlarged periphery of the gasket 25 is caused to make a secure joint between the inwardly-turned end of the record-blank and the end plate.

To the projecting lower end 28 of the bolt 5, at what I have termed the "base of the device," a suitable pipe is connected, provided with suitable valves and a branch pipe, one of such pipes being adapted to conduct steam from a steam-boiler, which steam may be admitted when required through the bore of the bolt and the lateral ports into the interior of the pressure-chamber to act upon the record-blank, while also when so required the steam may be cut off and the operation of the valve of the second pipe will admit pressure-air from a suitable pressure-chamber through the bolt in the same manner. The connecting-pipes for the conduct of steam and air are not illustrated in the accompanying drawings; but I already described such in my prior United States Patent Specification No. 692,337, February 4, 1902.

It is to be understood, as I have before explained, that there is an appreciable space 13 between the outer surface of the record-blank and the inner surface of the matrix and this space would contain air. If there was no outlet for that air to escape when the record-blank is closing on the surface of the matrix, there would be formed on the surface of the said blank air holes or depressions, which

would render the record imperfect. To overcome this difficulty, I provide a number of perforations 29 through the top plate 4 to form air-holes in line with the space between
 5 the record-surface and the matrix-surface and other perforations 30 through the material of the matrix itself at the base. I have found by practice that when these holes 30 in the
 10 base of the matrix are made small the record material will not be pressed through enough to prevent producing the required effect, and I would point out that since the pressure fluid is delivered by the ports 7 about centrally of the pressure-chamber 8 the air in the space
 15 between the record-blank and the matrix is forced outwardly toward each end and freely escapes by the aforesaid perforations.

In operating with the device for the production of the record the blank is inserted
 20 within the matrix, the pressure-tight joints are closed by the operation of the devices before described, the pressure fluid and heat, such as steam, is admitted to the pressure-chamber, the record-blank is softened or rendered plastic and forced outward with consid-
 25 erable pressure into contact with the matrix-surface, and the air between the surfaces being brought into contact escapes by the end perforations aforesaid. This operation having been sufficiently effected, the steam-pres-
 30 sure is cut off and pressure-air turned on and allowed to communicate with the interior of the pressure-chamber, the device is cooled externally by water or other suitable medium, which causes a slight shrinkage of the record-
 35 cylinder, and finally the latter is removed from the device as a finished manufacture.

At Fig. 2 of the drawings I have illustrated a constructional modification the general ar-
 40 rangement and employment of which will be readily understood from the previous description, and therefore I will only now deal with the points of difference. For instance, the central bolt 5 is formed in a piece with the
 45 base-plate 3, and the flanged collars 14 and 24 slide freely upon the bolt and are forced, respectively, toward the base-plate 3 and the top plate 4 by a helical spring 31, which surrounds the bolt 5 within the pressure-cham-
 50 ber, and by these means I am enabled to dispense with the slide-plug 19 and the nut 21, (shown at Fig. 1,) although I usually employ the apparatus as described in the latter figure.

If found requisite, I may in some cases form
 55 perforations 32 in the top plate 4 and perforations 33 in the base-plate 3 to allow of air escaping from between the outer surfaces of the rubber gaskets and the inner surfaces of the end plates of the apparatus.

60 What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for the manufacture of duplicate sound-record cylinders for phono-
 65 graphs and similar machines; the combination with an electrodeposit cylindrical matrix

to receive a blank celluloid cylinder having inturned ends, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial
 70 passage-way from the external end of the bolt to about the central part thereof, and ports through the bolt-walls to the interior of the cylinder-blank, a base-plate near the lower
 75 end of the bolt having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and the flange of the blank, a central aperture in
 80 the top plate through which the bolt passes, and means for clamping the top plate upon the bolt to clamp the matrix between the top plate and the base-plate; of upper and lower flanged collars on the bolt, an annular elastic
 85 washer between the under surface of the top plate and the upper surface of the adjacent flanged collar, an elastic washer between the upper face of the base-plate and the under face of the other flanged collar on the bolt,
 90 and means for compressing the elastic washers against the inner surfaces of the top plate and base-plate, substantially as set forth.

2. In an apparatus for the manufacture of duplicate sound-record cylinders for phono-
 95 graphs and similar machines; the combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder having integrally-inturned ends, an inwardly-extending flange at the base of the matrix to sup-
 100 port the wider flange of the blank cylinder the flange being perforated for the escape of air from between the blank and matrix, a bolt passing centrally and axially through the blank cylinder and the matrix, and having a
 105 central axial passage-way from the external end of the bolt to about the central part thereof for the entrance of the pressure steam or air, and having lateral ports through the walls to admit the pressure steam or air to within
 110 the cylinder-blank to force the latter against the matrix for impressing the blank, a base-plate near the lower end of the bolt, having a circular groove in its upper face to receive the inwardly-turned flange of the matrix, a
 115 top plate having a groove on its under surface to receive the upper end of the matrix and the smaller flange of the cylinder-blank, and having perforations through the top plate for the escape of air from between the blank and
 120 the matrix, a central aperture in the top plate through which the bolt passes, and a nut on the projecting upper end of the bolt to clamp the matrix between the top plate and the base-plate; of upper and lower flanged col-
 125 lars on the bolt, an annular elastic washer between the under surface of the top plate and the upper surface of the adjacent flanged collar, an elastic washer between the upper face of the base-plate and the under face of the
 130

other flanged collar on the bolt, and means for compressing the elastic washers against the inner surfaces of the top plate and the base-plate to make steam-tight joints between the latter plates and the flanges of the cylinder-blank, substantially as set forth.

3. The combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder, having integrally-inturned ends which is to be impressed with the sound-record, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof, and lateral ports through the walls of the bolt to the interior of the matrix, a base-plate having a circular groove on its upper face to receive the flange of the matrix and a central aperture in the base-plate through which the bolt passes, a collar fixed on the bolt, an elastic washer between the collar and the upper face of the base-plate, and a nut on the lower end of the bolt to compress the elastic washer between the base-plate and the fixed collar to make a tight joint between the base of the blank and the base-plate; of a top plate having a central aperture through which the bolt passes, and having a circular groove to receive the matrix and blank-cylinder end, a nut on the exterior upper end of the bolt to cause the top plate to clamp the matrix, a collar on the bolt opposite the inner face of the top plate and capable of sliding on the bolt, an elastic washer between the collar and the top plate, and means operated from the exterior of the apparatus for sliding the collar on the bolt to compress the elastic washer and so make a tight joint between the top plate and the blank, substantially as set forth.

4. The combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder having integrally-inturned ends, which is to be impressed with the sound-record, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof, and lateral ports through the walls of the bolt to the interior of the matrix, a base-plate having a circular groove on its upper face to receive the flange of the matrix and a central aperture in the base-plate through which the bolt passes, a collar fixed on the bolt, an elastic washer between the collar and the upper face of the base-plate, and a nut on the lower end of the bolt to compress the elastic washer between the base-plate and the fixed collar to make a tight joint between the base of the blank and the base-plate; of a top plate having a central aperture through

which the bolt passes, and having a circular groove to receive the matrix and blank-cylinder end, a nut on the exterior upper end of the bolt to cause the top plate to clamp the matrix, a collar on the bolt opposite the inner face of the top plate and capable of sliding on the bolt, an elastic washer between the collar and the top plate, a slide-plug passing from the exterior upper end of the bolt into an axial bore-hole therein, slots in the walls of the bolt below the top plate, a transverse pin connecting the slide-plug and the collar and passing through the slots in the walls of the bolt, and a nut on the exterior end of the slide-plug acting against the end of the bolt for operating the slide-plug to draw up the collar and make the joint, substantially as set forth.

5. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines, the combination with a cylindrical electrodeposit matrix having at one end an inwardly-extending flange and adapted to receive a blank celluloid cylinder having inturned ends, one of which is supported upon the flange of the aforesaid matrix, of a base-plate having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and flange of the blank, means for connecting the said base and top plates and for applying compressive tension thereto, annular elastic washers against the inner surfaces of the base and top plates, and means for applying pressure to the elastic washers to hold the same against the inner faces of the top and base plates, substantially as set forth.

6. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines, the combination with a cylindrical electrodeposit matrix having at one end an inwardly-extending flange and adapted to receive a blank celluloid cylinder having inturned ends, one of which is supported upon the flange of the aforesaid matrix, of a base-plate having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and flange of the blank, means for connecting the said base and top plates and for applying compressive tension thereto, annular elastic washers against the inner surfaces of the base and top plates, upper and lower flanged collars bearing against the said elastic washers, means for compressing the elastic washers against the inner surfaces of the top and base plates, and means providing for the introduction within the matrix and blank celluloid cylinder of a fluid under pressure, substantially as set forth.

ADEMOR N. PETIT.

Witnesses:

H. REVILLE BEEBY,
H. T. CRAMER-ARBUTS.

No. 750,119.

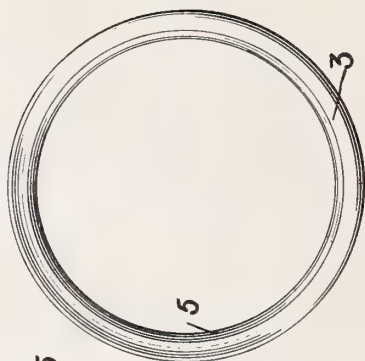
PATENTED JAN. 19, 1904.

A. N. PETIT.
CELLULOID PHONOGRAPH RECORD CYLINDER.

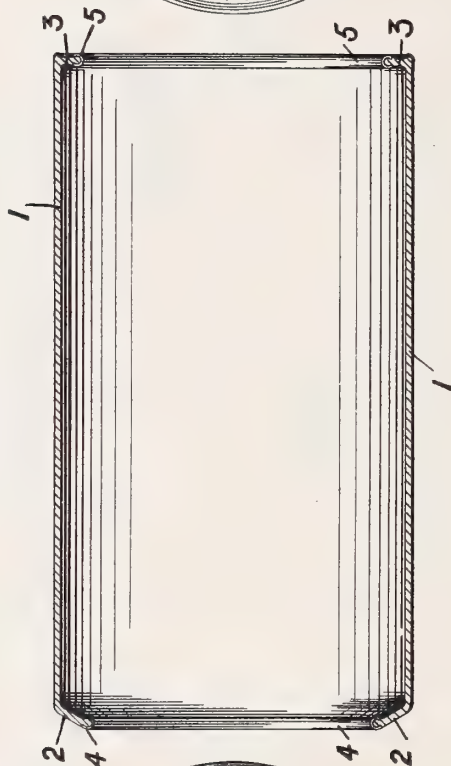
APPLICATION FILED MAR. 25, 1903.

NO MODEL.

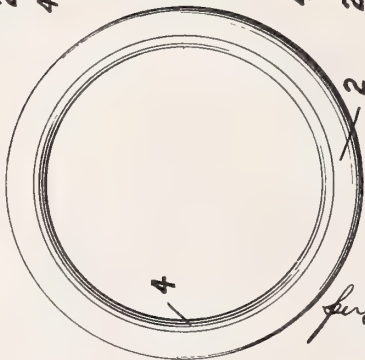
—FIG. 2.—



—FIG. 1.—



—FIG. 3.—



Witnesses
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UNITED STATES PATENT OFFICE.

ADEMOR N. PETIT, OF WATERLOO, NEAR LIVERPOOL, ENGLAND.

CELLULOID PHONOGRAPH RECORD-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 750,119, dated January 19, 1904.

Application filed March 25, 1903. Serial No. 149,475. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR N. PETIT, a citizen of the United States of America and a resident of Waterloo, near Liverpool, Lancashire, England, have invented certain new and useful Improvements in Celluloid Phonograph Record-Cylinders, of which the following is a specification.

Cylinders for phonograph and the like instruments, upon the exterior circular surface of which cylinders the records are to be engraved or cut, have generally been made of wax-like compositions or have been composed of a tubular base with an outer coating of wax-like composition to receive the record-engraving, and the cylinders have been adapted to be slid onto a conical mandrel carried by the instrument. Recently many of these record-cylinders have been made wholly of celluloid or have been provided with celluloid surfaces upon which the record-engraving has been produced, and when so constructed such cylinders have presented many advantages in use, they are practically indestructible, and they retain a perfect record of the sound-waves received from the transmitting instrument.

This invention treats of record-cylinders which are formed wholly of celluloid. Now such cylinders in order to adapt them to be slid and to fit onto the tapering mandrel have been made as described in my prior United States Patent specification, No. 666,937, January 29, 1901, with one end bent inwardly—viz., that end which is to fit onto the large end of the mandrel—and the other end of the celluloid record-cylinder has been fitted with a ring of celluloid suitably cemented to the record-cylinder by means of an appropriate solvent of celluloid, and that ring has been made to fit the smaller end of the mandrel.

In the specification of my United States Patent No. 657,956, September 18, 1900, I have described as a new article of manufacture a celluloid record-cylinder in which both the ends are integrally bent, the length of the cylinder inwardly bent at one end being greater than the length of the cylinder inwardly bent at the other end, the two inwardly-extending ends being of different di-

ameters, so that they shall fit onto the tapering mandrel which is to carry the cylinder and grip that mandrel frictionally in such manner that the external surface of the cylinder should be concentric throughout with the axis of the mandrel, an air-space being left between the outer surface of the tapering mandrel and the inner surface of the record-cylinder. I have found that this latter construction of cylinder with the integrally bent ends is admirably adapted for the purpose of its use, possessing as it does good wearing qualities and general durability, as well as lightness of weight. Thus my construction of cylinder with integrally inwardly bent ends, as described in my previous specification, No. 657,956, met the requirements called for in this article in nearly every respect, practically the only fault being that the expansion and contraction of the substance (celluloid) of which it was composed, due to the changes of temperature, caused the cylinder to fit not always on the same place upon the mandrel, and therefore the object of my present invention is to construct the cylinder in such manner that this defect shall be non-existent. To this end and according to my present invention I form the cylinder wholly of celluloid of sufficient thickness to be self-supporting and having its ends inturned, as before explained, the internal diameter of one of the inturned ends being less than the internal diameter of the other inturned end, and the edges of these inturned ends I cause to enter the outwardly-extending flanges of annular channel-section rings, which rings are made of metal having a much smaller coefficient of expansion than the celluloid of which the cylinder is otherwise wholly composed. By this arrangement any expansion or contraction of the celluloid cylinder does not affect the fit of the rings which carry it upon the mandrel, the metal rings always fitting upon the same places on the said mandrel, while the outturned flanges of the rings hold the edges of the cylinder.

I am aware that it has been heretofore proposed when employing a flat disk of very thin celluloid for the purpose of receiving a record for a sound-reproducing instrument to provide the said thin flat disk with a metal bind-

ing or edging in order to increase its stiffness and stability; but such edging while serving a different purpose to the rings which I apply to the inturned edges of my cylinder consists of an annular channel-section ring, with the flanges inwardly turned to the axis, whereas the rings I apply must have the flanges of the channel-section outwardly turned to receive the inturned edges of the cylinder for the purpose of allowing the internal peripheries of the rings to fit around and onto a mandrel, whereas the binding previously applied to a flat thin disk has not been employed for effecting such a purpose and was not for such a use.

In the drawings, Figure 1 is a longitudinal section of a cylinder according to my invention, Fig. 2 being an elevation of the right-hand end of the same and Fig. 3 an elevation of the left-hand end.

As described in the specification of my previous patent, No. 657,956, the cylinder or record 1 is formed from a tube of celluloid of a suitable diameter, the said tube being of sufficient thickness for strength, while the interior diameter is somewhat greater at any point than the diameter of the mandrel which is to carry such a cylinder. The ends of this cylinder are turned inward, so that both inturned edges shall nearly fit the surface of the mandrel when the cylinder 1 is placed thereon, and therefore it follows that the length turned in at the end 2 must be greater than the length turned in at the end 3. The annular edges of the inturned ends 2 3 of the cylinder are provided with metal rings, (marked, respectively, 4 5,) the internal diameter of these rings being such that they will accurately fit upon the mandrel when the cylinder is located in the correct longitudinal position thereon. The rings 4 5 consist of comparatively thin metal, which has been bent or pressed into a U-shaped section, so that the arms in that U-section grip the inturned celluloid edges of the cylinder, the process of manufacture of such a cylinder, with its annular

metal edges, forming the subject of a United States Patent application by myself, Serial No. 149,473, filed simultaneously with this patent application. The phonographic record is then impressed upon the surface of this cylinder after the manufacture of the same has been completed—that is to say, after the ends 2 3 have been inwardly turned and after the metal rings 4 5 have been formed in their position shown. The formation of the record upon the surface of the cylinder is effected in a manner which is well known—namely, by inserting the celluloid cylinder within a matrix which is itself an electrotpe taken from a wax cylinder, and then the celluloid receives internal pressure and is expanded against the internal surfaces of the electrotpe-matrix.

I claim as my invention—

As a new article of manufacture, a celluloid cylinder for receiving phonographic records, consisting of a tube of celluloid of sufficient thickness to be self-supporting, of larger internal diameter than the mandrel by which it is to be carried, and having integral inwardly-bent ends, the length inwardly bent at one end being greater than the length inwardly bent at the other end, a metal ring of channel-section having the flanges of the channel facing outwardly from the axis of the ring to receive and carry the smaller diameter edge of one inturned end of the cylinder, and a similar ring of larger diameter having an outwardly-facing channel to receive the edges of the inturned part of the other end of the cylinder, the internal diameters of the two metal rings being such as to fit on the mandrel of the machine, and a phonographic record formed on the outer surface of the cylinder, substantially as set forth.

ADEMOR N. PETIT.

Witnesses:

REVILLE BEEBY,
H. T. CRAMER-ARBUTS.

710,460.

750,460

No. 750,460.

PATENTED JAN. 26, 1904.

H. JONES.
SOUND RECORDING AND REPRODUCING MACHINE.

APPLICATION FILED DEC. 7, 1900.

NO MODEL.

Fig. 1.

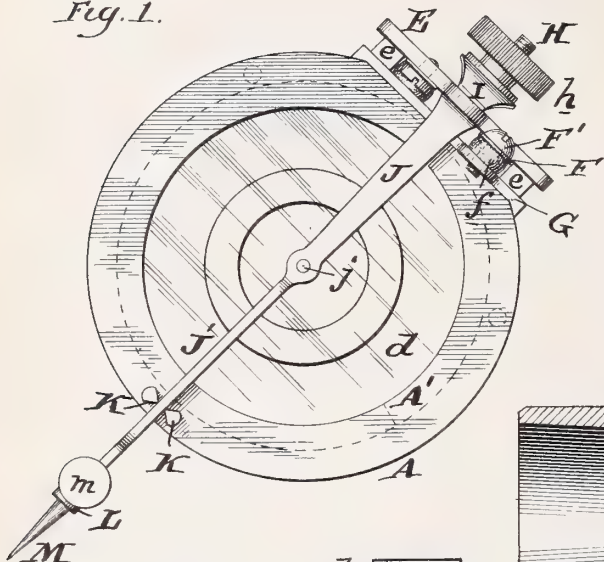


Fig. 2.

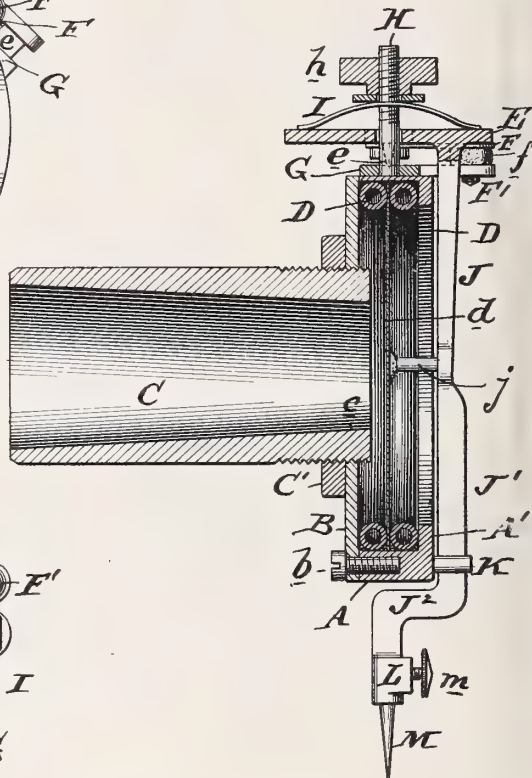


Fig. 3.

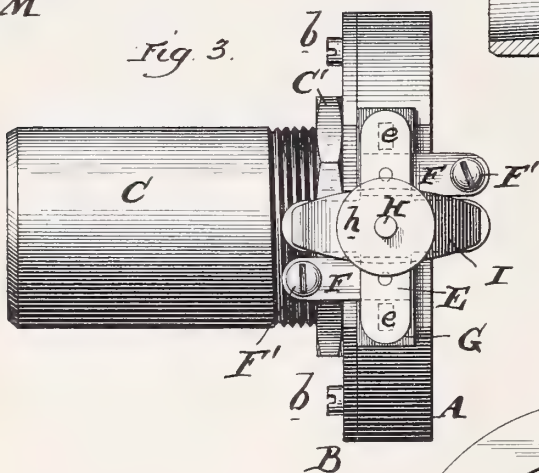
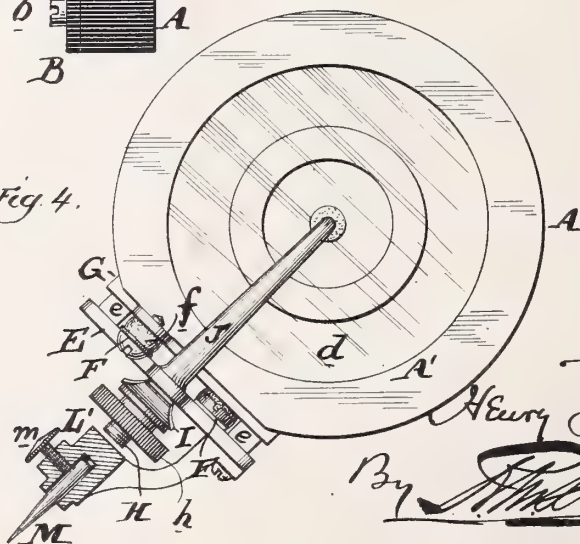


Fig. 4.



Witnesses:

H. B. Hallock.
P. M. Sully.

Inventor.

Henry Jones

By *[Signature]*
Att'y.

UNITED STATES PATENT OFFICE.

HENRY JONES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO ROBERT L. GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

SOUND RECORDING AND REPRODUCING MACHINE.

SPECIFICATION forming part of Letters Patent No. 750,460, dated January 26, 1904.

Application filed December 7, 1900. Serial No. 39,031. (No model.)

To all whom it may concern:

Be it known that I, HENRY JONES, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in
5 Sound Recording and Reproducing Machines, of which the following is a specification.

My invention has reference to sound recording and reproducing machines; and it consists of certain improvements which are fully set
10 forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

My invention more specifically relates to that portion of sound recording and reproducing machines known as the "sound-box,"
15 and comprehends certain improvements therein for more perfectly securing accurate records and also for producing the proper vibrations from the previously-prepared record to
20 secure the perfect reproduction of articulate sounds, of music, &c., with the avoidance of the metallic or scratchy sounds which are so common in instruments of this class and which materially interfere with the articulation.

In carrying out my invention I provide a sound-box of a suitable construction whereby the diaphragm may be readily inserted and removed without bending it and at the same time maintaining it of a diameter equal to the
30 full internal diameter of the box. I further support the diaphragm upon elastic cushions without bending or springing it out of shape and connect it to the stylus-lever by a suitable wax or other plastic connection. The stylus-
35 lever is pivoted at one end of the box in such a manner that its fulcrum is in alinement with the plane of the diaphragm and is supported in such position by means of adjustable spring connections. The free end of the lever is bent
40 over in such a manner as to bring the stylus also into alinement with the plane of the diaphragm, whereby the stylus, the diaphragm, and the pivot-points of the stylus-lever are in the same plane common with the diaphragm,
45 so that any vibration of the diaphragm will cause the vibrations of the stylus to be in exact accordance with those of the center of the diaphragm, according to whether the instru-

ment is used for recording or reproducing. In addition to the spring-supports for the stylus-lever above mentioned an additional adjustable spring is employed for varying the tension put upon the stylus-lever to regulate its response to movement, the said spring being readily adjustable independently of the
55 other two balance-springs which hold the stylus-lever in its normal position upon the sound-box.

My invention also comprehends other details, all of which will be better understood by
60 reference to the drawings, in which—

Figure 1 is a front elevation of a sound-box for recording embodying my invention. Fig. 2 is a sectional elevation of same. Fig. 3 is a plan view of same, and Fig. 4 is an elevation similar to Fig. 1 of a modification of my improvements more especially adapted for reproducing sounds.

A is the sound-box proper and consists of a circular body having an inwardly-directed
70 flange A' of considerable depth.

D D are two cushions, of tubular rubber, fitted to the interior circular walls of the box A and supporting between them the diaphragm d, of mica or other suitable flexible material,
75 which has a diameter substantially equal to the internal diameter of the box A.

B is the back plate and is secured to the box A by means of the screws b. When the plate B is removed, the rubber cushions D and
80 the diaphragm d may be inserted into the box A from the back without in any manner springing or weakening the diaphragm, and the pressure of the plate B upon the rubber cushions D holds the diaphragm normally in central
85 position.

C is the tubular extension to which the horn is attached and is screwed into the back plate B and locked in position by a lock-nut C', whereby its inner end may be adjusted nearer
90 to or farther from the diaphragm d, as desired. The interior of this tube C is provided with a conical aperture c, which may be smaller at the end adjacent to the diaphragm d than at the other end. The extent of the opening
95 of the tube adjacent to the diaphragm may be

varied to suit different records. For example, in those adapted to produce heavy sounds the aperture *c* should be smaller than in those cases where light delicate sounds are to be reproduced. This tube is readily removable and when desired may be replaced by another having a different-sized aperture. Furthermore, it may be adjusted to or from the diaphragm to increase or decrease the sound.

J is the stylus-lever and is connected at one end with a plate E, extending back over the sound-box and provided with knife-edges *e e* at considerable distance apart, which act as fulcrum by rocking upon the fulcrum-plate G, attached to the sound-box. These fulcrum are so arranged as to be in alinement with a plane through the diaphragm *d*.

F F are two springs secured to the stylus-plate E and projecting in opposite directions and having their free ends held down under the action of adjusting-screws F', which pass through the springs and into extensions of the fulcrum-plate. Rubber cushions *f* may be interposed between the springs F and the fulcrum-plate and surrounding the screws F' for more perfectly securing the proper adjustment and preventing any possibility of rattling of the springs in connection with the adjusting-screws. The lever J is provided with an inwardly-directed stud *j*, provided, if desired, with an enlarged head which is brought close to the diaphragm, and said stud is secured thereon by wax or other plastic compound. In the case of a recording sound-box the stylus-lever J is extended beyond the stud *j*, as indicated at J', and the free end is turned inward below the sound-box, as at J², and provided on said end with a stylus-socket L, having a clamping-screw *m* for holding the stylus M, the proportions of the parts being such that the stylus is also in alinement with the plane passing through the diaphragm D. It will now be seen that any vibration imparted to the diaphragm will cause the stylus to swing to the right or left in exact accordance with the vibrations of said diaphragm at its central part, and the extent of these vibrations to one side or the other will be precisely in accordance with what they should be to correspond to the vibrations necessary to the diaphragm. When this instrument is employed to record sound, the records so produced will be of precisely the character, which will in turn when operating with a sound-box of the same general character, but for producing sounds, produce exact counterparts of the sounds which were employed in making the record. These constructions therefore are especially advantageous in use in connection with records adapted for gramophones. Having once adjusted the springs F for normal work, it is undesirable to tamper with them when adjusting the sound-box for records of soft or loud tones. To provide an additional means for ready adjustment for

more positively or firmly holding the stylus against vibration, or vice versa, I provide a leaf-spring I, the free ends of which press upon the stylus-lever plate E on opposite sides of the fulcrum *e*, so as to force said fulcrum more firmly upon their supports and to secure a greater spring resistance to the oscillation of the plate in either direction. The spring I is held in place by a stud H, projecting from the sound-box and having thereon an adjusting-nut *h*, adapted to be screwed down upon the central portion of the spring I, so as to vary its tension. The stud H passes through a large hole in the plate E and does not interfere with its vibrations. It will be understood that by means of this additional adjusting-spring a greater or less adjustment may be secured for the stylus-lever J, whereby a greater or less power exerted thereon by the diaphragm is required to operate the stylus. It will also be observed that the action of this spring I, as well as the springs F, is to apply a spring action upon each side of the fulcrum *e*, so as to properly balance the stylus-lever. While the adjustments of the springs F are independent and must be made with judgment, so as to cause the stud *j* to take its proper position relatively to the diaphragm *d*, the adjustment of the spring I is much more simple and may be secured readily without fear of disturbing the preliminary adjustment made with the springs F.

While I prefer to use the rubber cushions *f*, surrounding the adjusting-screws F', the said cushions may be dispensed with, if so desired.

The extension J' of the stylus-lever is made flat and may be guided between two knife-edged pins K K on the sound-box to stop any lateral movement of the lever, this being intended for use in the particular construction employed for recording, because the length of the stylus-lever between its fulcrum-point and the stylus-point is much greater than in the case of the stylus-lever when employed for reproducing sounds.

The general construction of my sound-box when employed for reproducing sounds is the same as that above described; but in this case the box is preferably turned around and the stylus-clamp L' directly connected with the plate E, as shown in Fig. 4. In the first case the stylus-lever was a lever of the third order, while in the latter case the stylus-lever is a lever of the first order; but otherwise the construction is precisely the same, and the stylus-point or knife-edge *e* and the diaphragm all lie in the same plane, so as to secure the same relative action of the diaphragm upon the stylus or the stylus-point upon the diaphragm.

By the construction herein shown, in which the box A has the inwardly-directed flange A' on its open end and a removable back plate B the diaphragm *d* may be of the largest size possible with a given box and be readily in-

serted without injuring it. Furthermore, the circular rubber cushion D upon the open side of the box is well shielded and protected against any possible accidental displacement, (which was not the case with my previous sound-box, shown, for example, in my patent No. 628, 813, of July 11, 1899). The construction here described is simple and inexpensive and at the same time secures the best relative arrangement and adjustment of the parts for accomplishing the desired results.

While I prefer the construction shown, I do not limit myself to the minor details thereof, as they may be modified in various ways without departing from the spirit of the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a sound recording and reproducing machine, a sound-box having a circular interior an inwardly-directed flange at its outer end and open at its inner end, combined with a diaphragm having a diameter approximately equal to the internal diameter of the box, circular rubber cushions arranged upon each side of the diaphragm close to its periphery and inclosed within the circular box, a stylus-lever adapted to be operated by the diaphragm and having fulcrum pivoted to the sound-box in alinement with the plane of the diaphragm-springs projecting upon each side of the fulcrum for holding the same down to their seats and producing an elastic resistance to the movement of the stylus-lever in either direction, a stylus-point detachably secured to the stylus-lever and arranged in the same plane with the diaphragm and fulcrum of the stylus-lever, and guiding knife-edges K, K for holding the stylus-lever against vibrations in a direction parallel with the plane of the diaphragm.

2. In a sound recording and reproducing machine, a sound-box having a circular interior an inwardly-directed flange at its outer end and open at its inner end, combined with a diaphragm having a diameter approximately equal to the internal diameter of the box, circular rubber cushions arranged upon each side of the diaphragm close to its periphery and inclosed within the circular box, a stylus-lever adapted to be operated by the diaphragm and having fulcrum pivoted to the sound-box in alinement with the plane of the diaphragm, springs projecting upon each side of the fulcrum for holding the same down to their seats and producing an elastic resistance to the movement of the stylus-lever in either direction, and an additional adjusting-spring acting upon the structure carrying the stylus-lever on opposite sides of the plane through the diaphragm and fulcrum, and an adjusting device to vary the tension on both ends of the springs simultaneously.

3. In a sound recording and reproducing machine, a sound-box containing a diaphragm,

combined with a rearwardly-extending tubular part having a conical interior with the smallest end adjacent to the diaphragm, means for adjusting and locking the said tubular extension in definite position upon the sound-box whereby the inner end thereof is brought nearer to or farther from the diaphragm but at all times held out of contact therewith, and a suitably-arranged stylus and lever adapted to be operated by the diaphragm.

4. In a sound recording and reproducing machine, a sound-box case having a diaphragm and a back plate, a stylus-lever and stylus adapted to be operated by the diaphragm, and a detachable rearwardly-extending cylindrical part having a conical aperture in which the smallest end of the aperture is adjacent to the diaphragm and the inner end of the cylindrical part projects beyond the inner face of the back plate of the case.

5. In a sound recording and reproducing machine, a sound-box having a diaphragm, a stylus-lever and stylus adapted to be operated by the diaphragm, springs carried by the stylus-lever plate and extending upon opposite sides of a plane through the pivots, adjusting-screws extending through the free ends of the springs for attaching them to the sound-box or an extension thereof, and an adjustable spring device having extensions acting upon the fulcrum-lever plate upon each side of a plane through the fulcrum whereby an increased or decreased resistance may be exerted simultaneously to oppose to a more or less degree a movement of the stylus-lever in either direction.

6. In a sound recording and reproducing machine, a sound-box having a diaphragm, a stylus-lever and stylus adapted to be operated by the diaphragm, springs carried by the stylus-lever plate and extending upon opposite sides of a plane through the pivots, adjusting-screws extending through the free ends of the springs for attaching them to the sound-box or an extension thereof, and a common adjustable spring device having extensions acting upon the fulcrum-lever plate upon each side of a plane through the fulcrum whereby an increased or decreased resistance may be exerted simultaneously to oppose to a more or less degree a movement of the stylus-lever in either direction, said spring devices consisting of a leaf-spring I having its ends resting upon the stylus-lever plate, a vertical stud H carried by the sound-box and screw-threaded, and an adjustable nut $\frac{1}{2}$ adapted to the stud and operating upon the middle portion of the leaf-spring.

7. In a sound recording and reproducing machine, the combination of a sound-box having a diaphragm, with a stylus-lever J connecting with the diaphragm and provided with a plate E having pivots e , e , springs F, F, projecting in opposite directions from the plate E

and a plane through the fulcra-pivots parallel to the diaphragm, adjusting-screws F' for varying the tension of said springs, and rubber cushions f' surrounding the adjusting-screws F' and adapted to receive the spring f' .

8. In a sound recording and reproducing machine, a sound-box having a diaphragm, combined with a stylus-lever extending transversely across the open end of the sound-box and connecting with the central part of the diaphragm and having one end pivoted to the sound-box in the plane of the diaphragm and having the other end provided with a stylus-point also in the plane of the diaphragm.

9. In a sound recording and reproducing machine, a sound-box having a diaphragm, combined with a stylus-lever extending transversely across the open end of the sound-box and connecting with the central part of the diaphragm and having one end pivoted to the sound-box in the plane of the diaphragm and having the other end provided with a stylus-point also in the plane of the diaphragm, spring devices for holding the pivoted end of

the stylus-lever to the sound-box, and guides K, K , for holding the opposite end of the stylus-lever against vibration in a direction parallel to the plane of the diaphragm.

10. In a sound recording and reproducing machine, the combination of a sound-box having a diaphragm, with a stylus-lever structure pivoted to the sound-box at widely-separated places by fulcra-pivots arranged in the plane of the diaphragm a bow or leaf spring I having its ends acting upon the stylus-lever structure on opposite sides of the pivot-points and plane of the diaphragm, a stud H carried by the sound-box, and an adjusting-nut h on said stud acting on the central portion of the spring I for varying the resistance to movement of the stylus-lever in either direction.

In testimony of which invention I have hereunto set my hand.

HENRY JONES.

Witnesses:

ERNEST HOWARD HUNTER,
J. W. KENWORTHY.

750,977

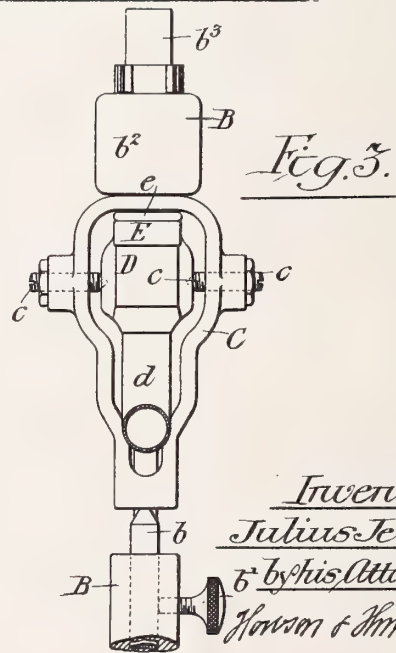
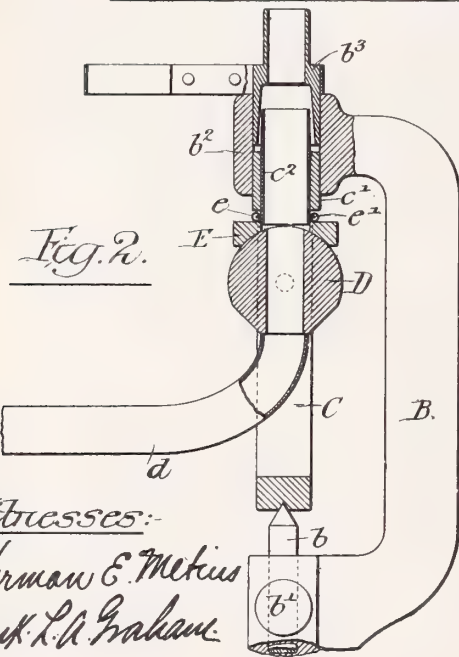
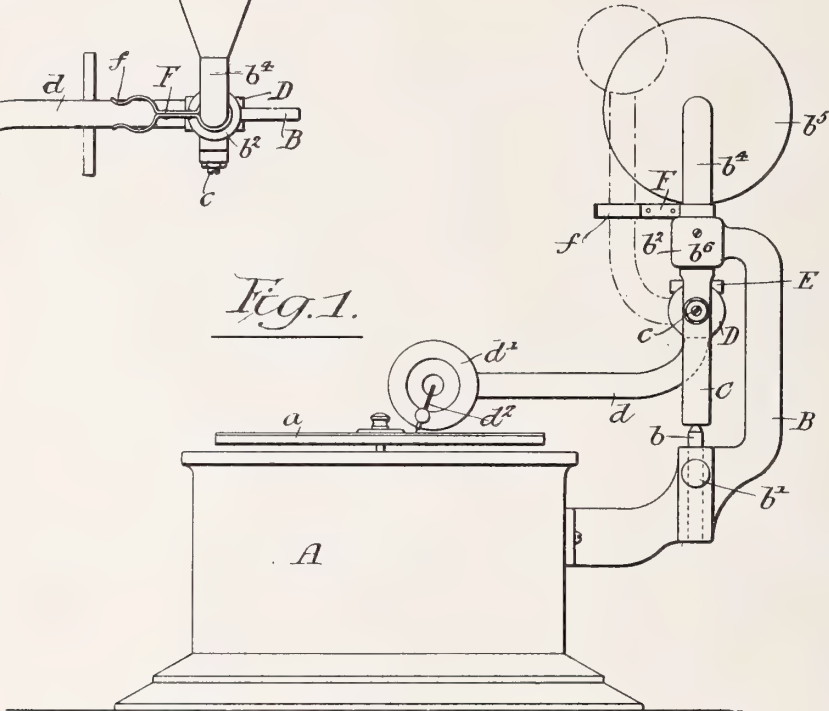
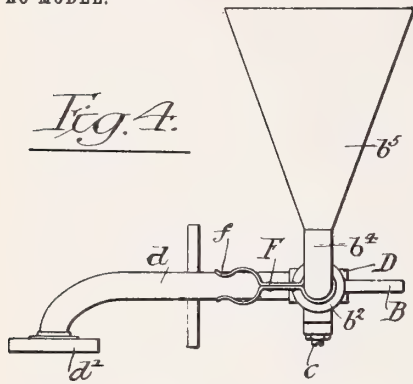
No. 750,977.

PATENTED FEB. 2, 1904.

J. JETTER.
SELF ADJUSTING ARM FOR TALKING MACHINES.

APPLICATION FILED MAR. 7, 1903.

NO MODEL.



Witnesses:
Norman E. McKim
Frank L. A. Graham

Inventor:
Julius Jetter,
by his Attorneys
Harrison & Harrison

UNITED STATES PATENT OFFICE.

JULIUS JETTER, OF CAMDEN, NEW JERSEY, ASSIGNOR TO ROBERT LAW GIBSON, OF PHILADELPHIA, PENNSYLVANIA.

SELF-ADJUSTING ARM FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 750,977, dated February 2, 1904.

Application filed March 7, 1903. Serial No. 146,706. (No model.)

To all whom it may concern:

Be it known that I, JULIUS JETTER, a citizen of the United States, residing at Camden, New Jersey, have invented certain Improvements in Self-Adjusting Arms for Talking-Machines, of which the following is a specification.

My invention relates to certain improvements in the detail construction of that part of a talking-machine particularly designed for the support of what is known as the "sound-box," and incidentally for the support of the horn.

The object of the invention is to provide an improved sound-box connection and support of such a design and construction that it shall be free to accommodate itself to records of different thicknesses as well as to unevennesses in the record itself.

The invention further provides means for adjusting at will the vertical height of the sound-box carrying-arm and is intended, moreover, to provide a conduit from the sound-box to the horn of such a construction and arrangement of parts that the volume of sound delivered from a given record shall be greater than has hitherto been obtainable and at the same time shall be free from certain objectionable elements usually noted.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved device, showing it as mounted upon a talking-machine. Fig. 2 is a sectional elevation showing the detail construction of the device illustrated in Fig. 1. Fig. 3 is a front elevation of my improved device, showing the trunnion-support for the box-carrying tubular arm; and Fig. 4 is a plan view of the structure shown in the preceding figures.

In the above drawings, A represents the casing of a talking-machine, having within it any desired form of mechanism (not shown) by which a record *a* in the shape of a disk may be rotated on a vertical axis.

B is a casting forming a standard, preferably held by screws or bolts to the side of the casing A and made with a recess or opening

in its lower portion, in which is carried a vertically-adjustable spindle or pivot *b*, this being held in any desired position by means of a set-screw *b'*. The upper portion of the standard is constructed to form a bearing (illustrated at *b''*) whose center line is preferably coincident with the center line of the spindle *b*. Within the upper part of this bearing is fitted a tubular piece or bushing *b''*, held in position by a set-screw *b''* and made with its upper end of a reduced diameter for the accommodation of an arm *b''*, which is tubular and carries upon its end a horn *b''*.

Fitting into the bearing *b''* from beneath and provided at its lower portion with a recess for the end of the spindle *b* is a yoke-piece C, which, as shown in Fig. 2, has at its top an upwardly-extending tubular portion *c'*, fitting in the bearing *b''*, above mentioned, so that as a whole the yoke is free to rotate on a vertical axis. I preferably so design this part *c'* so that it does not under any circumstances directly touch the piece *b''* fitting within it, a tube *c''* having its walls reduced in thickness at the upper end, so that it extends into but is out of contact with said piece. This latter is provided with a tapering cavity formed in continuation of the passage through it for the accommodation of the tube *c''*, which, as above noted, should not touch the interior of said part. Projecting through the sides of the yoke-piece are trunnion screws or bolts *c*, serving to support on a horizontal axis a preferably cylindrical piece D, formed with a passage through it and carrying as a continuation of said passage a tubular arm *d*, which is curved downwardly and outwardly. It will be understood that while for ease of construction I use a cylindrical piece, as shown, a spherical piece may in some cases be substituted. The end of the arm *d* is again bent at right angles and has fixed to it a sound-box *d'*, provided with a stylus *d''* for engagement with the record *a*. It is to be noted that wherever the arm *d* changes its direction such change is made in as gentle a curve as possible, it being desired to avoid abrupt turns and sharp corners in the various passages between the sound-box and the horn, thereby interfering to the

least practical extent with the sound-waves during their movement between these parts of the apparatus.

The outer cylindrical surface of the piece D is carefully finished and has bearing upon it a saddle-piece E of rectangular outline when viewed from above and made so that its under surface conforms to the said cylindrical surface of the piece D. This piece E is yieldingly pressed against the piece D by any desired form of spring, which in the recent instance is made in the form of a ring of rubber tubing *e*, having within it a resilient wire *e'*. As shown in the drawings, the piece E has through it a circular opening, preferably larger in diameter than the channel or passage through the piece D, into which fits the lower end of the tube *c*², and it is to be noted that when the arm *d* is in its normal position—that is, with the stylus in engagement with the record—there is a continuous channel or passage from said arm through the pieces D and E, through the spring-ring *e*, the tube *c*² of the yoke C, bushing *b*², and through the tube *b*⁴ to the horn *b*⁵.

I preferably place on the upper portion of the bushing *b*³ a spring-clip F, which is freely movable in a horizontal plane and is provided with resilient jaws *f* for the reception of the arm *d* when this is turned on its trunnion-screws *c* into the position shown in dotted lines in Fig. 1.

It will be seen that in operation as the record *a* is turned on its vertical spindle the tubular arm *d*, being freely movable up and down, can accommodate itself not only to inequalities in the surface of the record, but also automatically adapts itself to the changes in level of said record where for any reason this does not revolve in a truly horizontal plane. It has been found by experiment that in operation this device results in the production of a greatly-increased volume of sound from which most of the objectionable scratching and unnecessary noise is absent. The weight of the arm *d*, with the sound-box *d'*, is to a great extent balanced, since it will be understood that the spring-ring *e* presses the piece E against the cylindrical surface of the piece D with a force sufficient to neutralize to a great extent the tendency of the arm *d* to revolve on its trunnion-screw under the action of gravity. It will further be noted that the yoke-piece C as a whole may be adjusted vertically, so as to retain the arm *d* and the sound-box *d'* in what has been found to be the most advantageous position relative to a record regardless of variations in the thickness of different records. When it is desired to remove a record, the arm *d* can be turned on its trunnion-screws and inserted in the jaws *f* of the spring-clip F, in addition to which the whole device can be turned on its vertical axis, so as to be completely out of the way.

By constructing the various parts connect-

ing the sound-box and the horn so as to avoid sharp corners or turns I am enabled to produce sounds of greater clearness and volume than have hitherto been obtainable, which desirable result is still further aided by avoiding direct contact between the parts *c*² and *b*³.

In addition to the advantages noted in connection with the operation of my invention it will also be seen that it may be constructed with ease and comparatively low cost, there being not only few parts, but very little soldering or machine-work necessary thereon.

I claim as my invention—

1. The combination of a casing of a talking-machine, a standard, a yoke-piece supported by said standard and free to revolve on a vertical axis, a piece engaged by said yoke at two points in such manner as to be free to turn on a horizontal axis and having through it a passage, a device, for receiving sound-waves, in communication with said passage, a conduit connected to said piece, and a sound-box attached to said conduit so as to form a continuous passage therefrom to the receiving device, substantially as described.

2. The combination of the casing of a talking-machine, a standard, a pivotal supporting structure and a bearing on the standard, a yoke engaged by said structure and entering the bearing, a sound-box and a tubular arm carried by said yoke-piece so as to be free to move around a horizontal axis, and means extending through the bearing and connecting the tubular arm with a sound-transmitting device, substantially as described.

3. The combination of the casing of a talking-machine, a standard, a horn supported by the standard, a yoke-piece also carried by the standard and free to turn on a vertical axis, a substantially cylindrical piece supported so as to be free to turn on a horizontal axis in said yoke and having through it a passage normally in connection with the horn, a tubular arm also in connection with the passage and a sound-box on said arm, substantially as described.

4. The combination with the casing of a talking-machine of a standard, a sound-transmitting device supported thereby, a yoke-piece carried by said standard, a substantially cylindrical piece supported by the yoke and free to turn on a horizontal axis, said cylindrical piece having through it a passage, a tubular arm connected to said piece in continuation of said passage, a piece fitting the curved surface of the cylindrical piece, with means for yieldingly pressing said two pieces together, substantially as described.

5. The combination of a standard, the casing of a talking-machine having mechanism for operating a record, a sound-transmitting device carried by the standard, said standard having a bearing, a tubular connection extending through the bearing and connected to said sound-transmitting device, a piece car-

ried by the standard and free to turn on a horizontal axis, said piece having fixed to it a tubular arm, a sound-box on said arm and means frictionally acting on said piece whereby the tendency of said arm to turn said supporting-piece is counteracted, substantially as described.

6. The combination of the casing of a talking-machine, a standard having a pivot and a bearing, a yoke-piece having a portion extending into said bearing and engaging said pivot, a piece having a passage through it and carried by the yoke so as to be free to turn on a horizontal axis, a saddle-piece fitted to the surface of said revoluble piece, means for pressing said two pieces together, and a tubular arm connected to said passage, with a sound-box carried on said arm, substantially as described.

7. The combination of a standard, a sound-transmitting device supported thereon, a tubular arm in connection with said device, a sound-box carried by said arm, the arm and the sound-box having means whereby they are supported so as to be free to turn on a horizontal axis, with a device carried by the standard for engaging said arm and retaining the same in a fixed position, substantially as described.

8. The combination of a standard, a vertically-adjustable pivot structure carried thereby, a yoke-piece engaging said structure and held by the standard so as to be free to turn on a vertical axis, with a tubular arm having a sound-box carried by said yoke so as to be movable on a horizontal axis, with a sound-transmitting device connected to said tubular arm, substantially as described.

9. The combination of a standard having a bearing, a tube fixed therein, a yoke-piece carried by the standard and having a portion extending into the bearing, a sound-box, a tubular arm carrying the same and movably supported by the yoke-piece, a saddle-piece bearing upon a portion of the tubular arm, and a second tube extending from the said saddle-piece to the tube fixed in said bearing, substantially as described.

10. The combination of a standard having a bearing, a tube fixed therein, a yoke-piece carried by the standard, and having a portion extending into the bearing, a sound-box, a tubular arm carrying the same and movably supported by the yoke-piece, and a second tube having means whereby it is operatively connected to the movable arm and extended into said first tube, substantially as described.

11. The combination of a standard, a tube carried thereby for connection to a sound-transmitting device, a tubular arm having a sound-box and supported so as to be free to turn on both a horizontal and on a vertical axis, and a tubular connecting-piece extending between said arm and the tube, with means for supporting said piece out of direct contact with the tube, substantially as described.

12. The combination of a standard, a tube carried thereby for connection to a sound-transmitting device, a tubular arm having a sound-box and supported so as to be free to turn on both a horizontal and on a vertical axis, and a tubular connecting-piece extending between said arm and the tube, said tube having a tapered recess for the reception of said connecting-piece, with means for supporting said piece in movable contact with the said arm and out of direct contact with said tube, substantially as described.

13. The combination of a standard having a bearing, a yoke-piece movably carried by the standard and having a tubular portion extending into said bearing, a tubular arm having an enlarged end portion and movably supported by the yoke-piece, a saddle-piece between the said end portion of the arm and the tubular portion of the yoke-piece, and an annular spring for pressing together said saddle-piece and the end of the arm, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS JETTER.

Witnesses:

HARRY E. MORGAN,
JOS. H. KLEIN.

No. 752,682.

PATENTED FEB. 23, 1904.

E. R. JOHNSON.
REMOVABLE TURN TABLE FOR SOUND RECORDING MACHINES.

APPLICATION FILED OCT. 1, 1902.

NO MODEL.

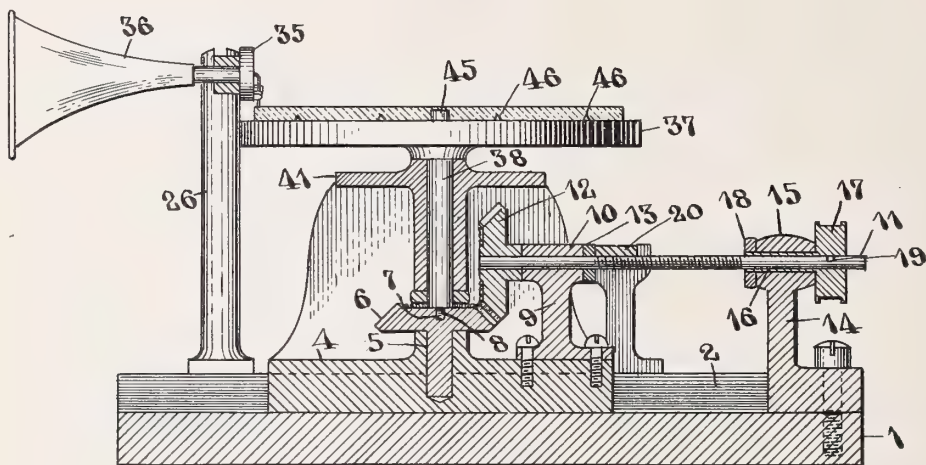


Fig. 1.

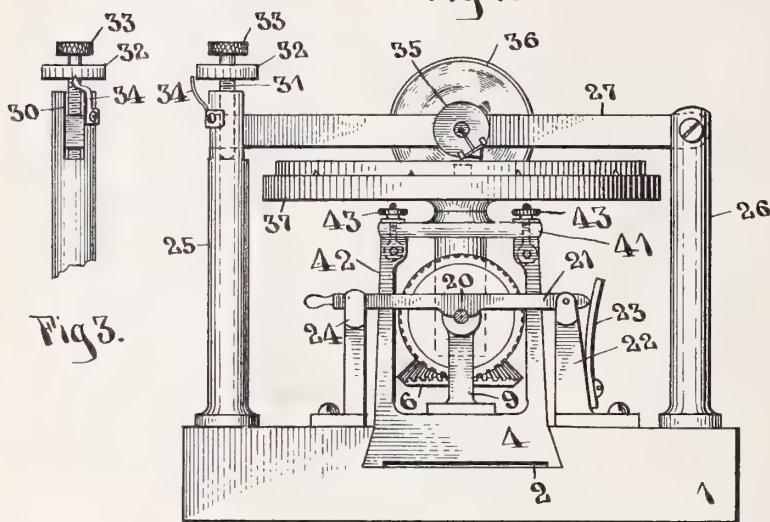


Fig. 2.

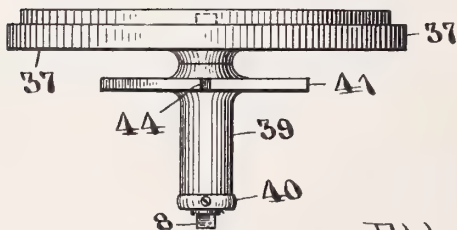


Fig. 3.

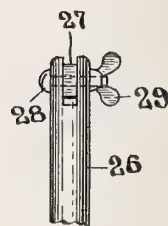


Fig. 4.

WITNESSES:

Edw. W. Vaile Jr.
Chas. H. Bennett

INVENTOR:

Eldridge R. Johnson.
by J. H. Little,
ATTORNEY:

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

REMOVABLE TURN-TABLE FOR SOUND-RECORDING MACHINES.

SPECIFICATION forming part of Letters Patent No. 752,682, dated February 23, 1904.

Application filed October 1, 1902. Serial No. 125,501. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Removable Turn-Tables for Sound-Recording Machines, of which the following is a full, clear, and complete disclosure.

My invention has for its object the production of a turn-table for sound-recording machines which will not only be more simplified in construction, efficient in operation, but will produce a record of greater accuracy, uniformity, and quality of tone than has heretofore been possible.

In the production of metallic matrices for use in reproducing sound-records the wax disk or plate is first turned down in a suitable turning-machine, so as to have an exactly plain and uniform surface. The wax disk or plate is then engraved by means of a recording-stylus, so as to have upon its surface the usual spiral sound-groove characteristic of talking-machines. This engraving may be done in the same machine in which the surface has been turned by merely substituting a sound-recording box for the original turning-tool; but I find it more convenient and advantageous to have the turning-tool and sound-recording box upon separate machines and to change the wax disk, with its turn-table, from one machine to the other. Heretofore in handling the wax disk when transferring them from one machine to the other the records have sometimes become more or less warped or bent out of their original perfectly plain condition. This warping or bending causes the recording-stylus to enter the surface of the wax disk at varying and uneven depths, which greatly impairs the character of the matrix, and therefore of the final record produced therefrom. This disadvantage I entirely obviate by keeping the wax disk at all times upon a single turn-table, which turn-table is provided with accurately-turned surfaces or bearings, which keep its axis and plane of rotation always the same in relation

to the working surface without regard to which machine the same is being used upon. To accomplish this, I mount the turn-table rotatably upon a member removable from the machine, and thus the relation of the working face of the turn-table and the face upon which it rotates is the same both when turning the wax disk or plate and when recording. Preferably I employ for this purpose the mechanism described in the accompanying specification, and illustrated in the drawings forming a part thereof, of which—

Figure 1 is a vertical longitudinal sectional view taken upon the line 1 1, Fig. 2. Fig. 2 is an end elevation of the same, the end bearing for the driving-shaft being removed. Fig. 3 is a side elevation of the supporting-post for the bar which carries the sound-box and shows the adjusting means therefor. Fig. 4 is a side elevation of the supporting-post at the opposite end of the side bar. Fig. 5 is a side elevation of the turn-table and its bearing detached from the machine.

In the drawings the numeral 1 indicates a suitable base-plate, having in its upper surface a suitable guideway 2, within which the frame 4, carrying the turn-table and its driving mechanism, is adapted to travel. Upon a vertical bearing 5, at about the center of the base of this frame, is provided a bevel-gear 6. This bevel-gear has upon its upper side a suitable socket 7, which is adapted to receive the rectangular end 8 of the turn-table shaft. Also mounted upon the base of said frame 4 is a standard 9, which carries at its upper end the horizontal bearing 10. Through this bearing passes a screw-shaft 11, upon the inner end of which is mounted a second bevel-gear 12, which is adapted to mesh with the first bevel-gear 6. The collar 13 is also fixed upon said shaft, so as to keep the bearing 10 confined between said gear and said collar. Adjacent one end of the base 1 of the machine is mounted a second upright standard 14, which carries at its upper end a second bearing 15, which is in alinement with the bearing 10, mounted upon the frame 4. A suitable bushing 16 surrounds the shaft 11, is contained within said

bearing, and carries at its outer end a grooved driving-pulley 17, while on its inner end is an adjustable collar 18. This sleeve and collar serve to hold the pulley 17 in position adjacent the end of the stationary bearing. The shaft 11 is provided with a suitable groove or keyway which is engaged by a pin or key 19, carried by the pulley 17. This construction allows the shaft 11 to slide longitudinally within the bearing 15 and the sleeve 16, while at the same time it is caused to revolve when the pulley 17 is revolved. The shaft 11 is screw-threaded for that portion of its length included between the collar 13 and the collar 18. This screw-threaded portion is adapted to cooperate with a half-nut 20, carried by the hinged bar 21. This bar 21 is hinged at one end to the support 22, which is fixed to the bed-plate 1 of the machine and which is provided with the plate-spring 23, which bears against the end of the bar 21 for the purpose of keeping it in its raised and lowered positions. The opposite end of the bar 21 is removably retained in position within a recess at the top of the support 24, also fixed to the bed-plate 1 of the machine. By this construction it will be seen that when the half-nut 20 is in contact with the shaft 11 and said shaft is revolved by the pulley 17 the frame 4, with its gears and other attached parts, will be caused to move longitudinally within the way or guide 2. When the shaft 11 has been advanced to a position such that the half-nut 20 is adjacent the end of its travel on the screw-thread, the lever 21 may be raised, thereby disengaging the half-nut 20 from the shaft and allowing the frame or carriage 4 to be returned quickly to the other end of its travel and the turn-table to be removed.

Attached to the bed-plate 1, at each side thereof are the vertical posts 25 and 26, which are adapted to support at their upper ends the sound-box or cutter-bar 27. This bar 27 is pivoted at one end to the post 26 by means of the bolt 28, having at one end thereof the thumb-nut 29. The opposite end of said bar 27 is adapted to slide in a slot 30 in the upper end of the post 25. For the purpose of accurate adjustment of this bar the micrometer-screw 31 passes vertically through the free end thereof and rests upon the lower end of the slot 30, its upper end being provided with the usual micrometer-index 32 and thumb-nut 33. A suitable pointer 34 is also attached to the end of the post 25.

The sound-box 35, or in a turning-machine its corresponding cutting-tool, is suitably attached to the bar 27, so that as the wax disk is moved beneath said bar the stylus or cutting-tool will always travel across the disk substantially on a radius thereof. In the recording-machine the usual amplifying and receiving horn 36 is attached to the sound-box tube. When it is desired to remove the turn-table and record-disk, the bar 27 may be

raised, thus leaving the space above the table unobstructed.

The turn-table proper consists of the rotatable disk or base 37, from the lower side of which projects the shaft or stud 38, which carries at its lower end a rectangular key or projection 8. An accurately-turned bearing 39 surrounds said shaft 38 and is held thereon by means of a collar 40. This bearing carries near its upper end a plate or bar 41, which is adapted to rest upon the tops of the supports 42, which form parts of the frame 4, and is held in position thereon by means of the pivoted thumb-nuts 43, which engage notches 44 in said plate. The wax recording-disk may be retained in position by the boss 45 and the spurs 46 or any other suitable means.

It will be seen that the turn-table 37, the bearing 39, and the supporting-plate 41, form a single united structure which is capable of being attached to any machine whether recording or turning and will always insure the turn-table revolving upon exactly the same axis and without any liability of the wax disk being displaced, bent, or otherwise damaged during the transfer from one machine to another.

It is my purpose in the manufacture of sound-records first to place the disk in position upon a turn-table, then place said turn-table upon the carriage of a machine which is provided with a cutting-tool, then accurately to turn the surface of the disk, so as to make the same perfectly smooth and flat, then to transfer said turn-table, with its attached bearing, to a second machine provided with the usual recording sound-box. A groove is then made in the usual way, and record thereby obtained is ready for the process of making the matrix. I am thus enabled to transfer the record from the planing-machine in which the record is turned smooth to the recording-machine without removing the soft wax from the rigid turn-table, obviating with certainty any damage thereto and insuring with certainty exactly the same relation with the working face of the record-tablet. By these means it is possible to use a much softer and more impressionable wax than has hitherto been employed, the record thereby being made much more accurately and with a retention of many of the overtones, which otherwise would be lost owing to the resistance of a harder wax.

I do not wish to be limited to the details of construction herein described, for changes may be made by one skilled in the art which may make the device more nearly perfect mechanically, but which do not depart from the spirit of my invention.

Having thus described my invention, what I desire to claim, and protect by Letters Patent of the United States, is—

1. The combination in a sound-recording machine, of a removable member, and a turn-

table carried thereby, removable therewith, and rotatable relative thereto.

2. The combination in a sound-recording machine, of a removable member, and a turn-
5 table carried thereby, removable therewith, and rotatable relative thereto, said member having bearing or contact surfaces, which are always in a fixed relation to the working surface of said turn-table, whereby said turn-
10 table may be transferred from one machine to another without altering its axis of rotation and without damaging the recording-disk carried thereby.

3. In a sound-recording machine, a turn-
15 table comprising a rotatable disk, said disk having accurately-turned bearing-surfaces, which are always in a fixed relation to the surface of said disk, and a member removable from said machine having bearing-surfaces correspond-
20 ing to and fitting the bearing-surfaces of the disk, upon which bearing-surfaces said disk is rotatable relative to said member.

4. The combination in a sound-recording machine, of a removable member having pro-
25 jecting parts adapted to be secured to said machine, and a turn-table carried by said member and removable therewith, and rotatable relative thereto.

5. The combination in a sound-recording
30 machine of a removable member having a cylindrical bearing, a turn-table having a shaft rotatable in said bearing, and a separable coupling between said shaft and operative parts of said machine.

35 6. A turn-table for sound-recording ma-

chines, comprising a rotatable disk adapted to have the recording-disk attached thereto, an accurately-turned cylindrical bearing attached thereto, an accurately-turned bearing-sleeve
40 carried by said cylindrical bearing, a supporting bar or plate attached to said sleeve and means to allow said plate to be secured to the recording-machine, substantially as described.

7. A turn-table for sound-recording ma-
45 chines comprising a rotatable disk adapted to have the recording-disk attached thereto, a bearing projecting therefrom, an angular stud projecting from the lower end of said bearing, a bearing-sleeve rotatively carried by said bearing, a collar fixed to said bearing to re-
50 tain said sleeve in position thereon, a supporting bar or plate attached to said sleeve and means to allow said plate to be removably secured to the recording-machine, substantially
55 as described.

8. In a sound-recording machine, uprising supports situated below the recording mechanism, a removable member having lateral
60 projections adapted to rest upon said supports, means for securing said projections upon said supports, and a turn-table carried by said member, removable therewith, and ro-
tative relative thereto.

In witness whereof I have hereunto set my
65 hand this 30th day of October, A. D. 1902.

ELDRIDGE R. JOHNSON.

Witnesses:

HORACE PETTIT,
JOHN F. GRADY.



752,274

No. 753,274.

PATENTED MAR. 1, 1904.

E. R. JOHNSON.
SOUND BOX FOR TALKING MACHINES.
APPLICATION FILED JAN. 20, 1900.

NO MODEL.

Fig. 1.

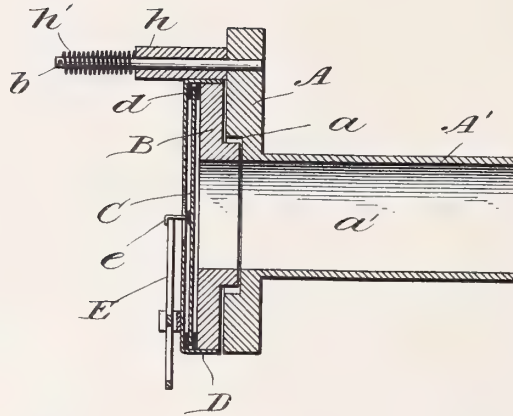


Fig. 2.

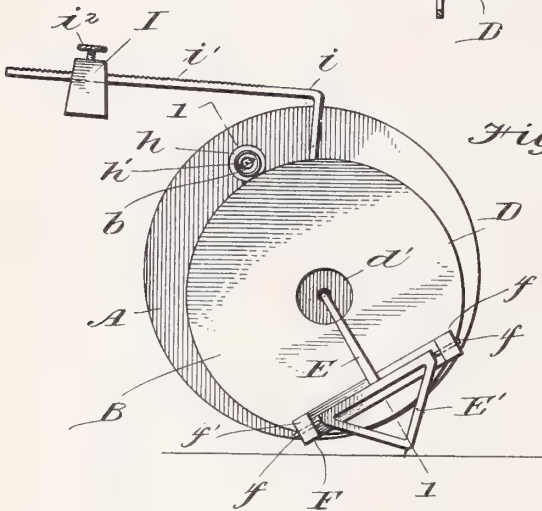


Fig. 3.

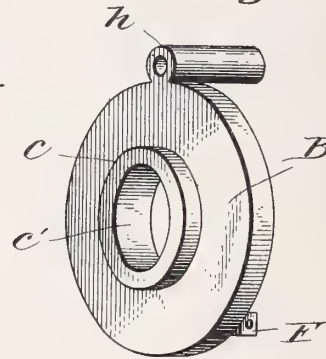
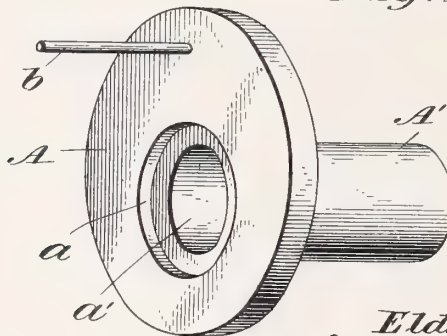


Fig. 4.



Witnesses.
Geo. T. Cross,
J. Henderson.

Inventor,
Eldridge R. Johnson,
By *1 June 1904,*
Attorney.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW
JERSEY.

SOUND-BOX FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 753,274, dated March 1, 1904.

Application filed January 20, 1900. Serial No. 2,174. (No model.)

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in sound recording and reproducing machines, and particularly to that part known as the "sound-box."

The principal object of my invention is to generally improve and simplify the construction of sound-boxes used in recording-machines, so that the very best results may be obtained.

A further object of my invention is to provide a sound-box so constructed as to readily yield to the impulses of the sound-waves in any and all directions; and a still further object of my invention is to provide a sound-box so constructed that the depth of the cut in recording can be regulated to suit the character of the record.

With these and other objects in view my invention consists in the construction and arrangement of the mechanism substantially as hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, in which similar letters of reference are used to indicate similar parts, Figure 1 is a sectional elevation taken about on the line 1 1 of Fig. 2. Fig. 2 is a front elevation of my improved sound-box, showing the parts in operative position. Fig. 3 is a detail perspective view illustrating the rear end of the diaphragm-holder, and Fig. 4 is a detail perspective illustrating the front face of the main supporting-frame of the sound-box.

In carrying out my invention I provide a circular supporting-disk A, which has formed thereon the usual tubular section A', which is connected directly or indirectly to a mouth-piece or other sound-conveying device. On the front face of the disk A, I provide a cir-

cular recess *a*, which is described on a diametrical line of the disk A, but slightly eccentric thereto. This recess *a* communicates, by means of the passages *a'*, with the mouthpiece or other receiver. Extending from the face of the disk A, at a point near the periphery thereof and on a line to the center of the disk A and the opening *a*, is a thin rod *b*, said rod being riveted or otherwise secured in the disk A.

The diaphragm-holder B comprises a circular disk somewhat smaller in diameter than the diameter of the disk A and has provided on its rear face a circular flange *c*, surrounding an opening *c'*. This opening and flange are concentric to the axis of the disk B, and the diameter of the circular flange *c* is slightly smaller than the diameter of the circular recess *a*, formed in the disk A. The diaphragm C, which is of a diameter slightly less than that of the disk B, is interposed between two elastic washers or gaskets *d d*, one of which bears against the front face of the disk B and which are held in position by means of the cap D, which may be screwed or otherwise secured to the periphery of the disk B. The center of the cap D is provided in its center with an opening *d'*, through which passes the nipple *e*, which is secured at one end to the center of the diaphragm C and has its forward end secured to the stylus-bar E.

The stylus-bar E when the device is in operative position sets at an angle in about the position illustrated in Fig. 2 of the drawings. The lower portion of the stylus-bar E is formed in the shape of a triangle, as E', and is pivotally mounted in a supporting-frame F, which is secured to the front face of the cap D. The pivot-screws *f* pass through threaded openings formed in the lugs *f'* at each end of the supporting-frame E and bear at their inner ends in slightly countersunk openings formed in the ends of the stylus-bar, thus permitting the said stylus-bar to swing in and out as the diaphragm is vibrated by the sound-waves. The stylus-point G is located slightly to one side of the vertex of the angle formed by the sides of the triangular portion of the stylus-bar and should enter the

recording material during operation at about right angles to the plane of the record.

Secured on the periphery of the disk B is a tubular sleeve *h*, the center of which is in a diametrical line with the center of the stylus-bar E. When the two parts A B of the sound-box are put together, the pin *b* enters the tubular sleeve *h*, and the flange *c*, formed on disk B, enters the annular recess *a*, formed in the disk A, and rests loosely therein, so as to be capable of a slight swinging movement from its pivotal point on the rod *b*. A coiled spring *h'* is provided on the projecting end of the rod *b* and has its outer end secured in an opening formed in said rod, while its inner end bears against the end of the sleeve *h*. This spring serves to keep the section B of the sound-box against the section A and at the same time allows it to yield slightly as the diaphragm vibrates.

It will be seen by referring particularly to Fig. 2 of the drawings that the diaphragm-holder B by reason of its being pivotally secured to the disk A will be capable of a slight swinging movement, and the circular flange *c*, which fits in the recess *a*, of a slightly-larger diameter than flange *c*, will serve to limit the movement of the said section B, and the stylus-point will rest by gravity on the recording-surface of the record-tablet.

In the periphery of the section B, I secure a rod *i*, located at a point to the right of the pivot *b*, the said rod *i* being bent at substantially right angles and extending outwardly above and beyond the pivotal point of the two sections A and B. On the upper surface of the horizontal portion of the rod *i* I form a series of notches or serrations, as *i'*. A weight I, having an opening through the same for reception of the rod *i*, is provided, and a set-screw *i''* passes through the upper end of the weight I and serves to hold the weight in an adjusted position on the rod. By means of this arrangement I am enabled to regulate the depth of the cut of the stylus-point in the recording material, as it will be readily seen that by adjusting the weight toward the end of the rod *i* the pivoted section B of the sound-box will be swung in such a direction as to move the stylus-point G in an upward direction, and thereby lessen the depth of the cut, and as the weight is shifted in the opposite direction the pivoted section B will fall slightly and cause the stylus-point to make a slightly deeper cut. This can be regulated by the operator so as to suit the character of the record being made.

I do not wish to limit myself to the exact form described, as various changes might be made without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a sound recorder and reproducer, a sound-box comprising a relatively stationary section adapted to carry the horn or trumpet, a diaphragm-holding section pivotally suspended on the stationary section and adapted to swing in a plane parallel to the face of the said stationary section, substantially as described.

2. In a sound recorder and reproducer, a sound-box comprising a stationary section adapted to carry the trumpet, a diaphragm-section pivotally suspended on the stationary section adapted to swing in a plane parallel to the face of the stationary section and means for limiting the swinging movement of the pivoted section substantially as described.

3. In a sound recorder and reproducer, a sound-box comprising a relatively stationary section adapted to carry the trumpet, a diaphragm-holding section pivotally suspended on the stationary section to one side of its vertical center and adapted to swing in a plane parallel to the face of the said stationary section, a stylus carried by the swinging section, and means for limiting the swinging movement of the said pivoted section, substantially as described.

4. In a sound recorder and reproducer, a relatively stationary disk having a connection thereon for the attachment of a trumpet, a circular recess formed in said disk, a diaphragm-holding disk pivotally suspended on the stationary disk out of line with its vertical center adapted to swing in a plane parallel to the face of said stationary disk, a circular flange formed on the rear face of the pivoted disk adapted to loosely fit in the recess of the stationary disk, a diaphragm supported in the pivoted disk, and a stylus-bar connected to said diaphragm, substantially as described.

5. In a sound recorder and reproducer, a relatively stationary disk vertically disposed and adapted to be connected with a trumpet, a diaphragm-holding disk eccentrically pivoted on the stationary disk in a plane parallel to the face of the stationary disk, a tension-spring on the pivot, and means for limiting the swinging movement of the said pivoted disk, substantially as described.

6. In a sound recorder and reproducer, the combination of a rigid disk having a tubular section connected thereto adapted to be connected with a trumpet, or other sound-conveying device, a smaller disk pivotally mounted on the rigid disk, a yielding connection at the pivotal point of the two disks, an annular recess formed on the front face of the rigid disk, a circular flange formed on the rear face of the smaller disk adapted to fit loosely in the circular recess of the said rigid disk, a diaphragm carried by the smaller disk and a stylus-bar connected with said diaphragm pivotally supported on the diaphragm-holding disk, substantially as described.

7. In a sound recorder and reproducer, a sound-box comprising an independent section adapted to be rigidly secured in the sound-box support, a diaphragm-holding section 5 pivoted eccentrically to the face of the relatively stationary section in a plane parallel to the face of said section, and means for adjusting the positions of the pivoted sections with relation to the record-tablet for regulating 10 the depth of the cut of the recording-stylus, substantially as described.

8. In a sound recorder and reproducer, the combination of a disk, having a tubular section for connection with the sound-conveying 15 device, a diaphragm-holding section eccentrically pivoted to the face of the stationary disk so as to be capable of a slight swinging movement in a plane parallel to the face of the said stationary disk, means for limiting 20 the extent of this movement, and mechanism for adjusting the position of the diaphragm-holding section with relation to the record-disk, substantially as described.

9. In a sound recorder and reproducer, the 25 combination of the disk A, having a tubular section adapted to be held by the sound-box support, a diaphragm-holding section B eccentrically pivoted to the face of the disk A, to one side of its vertical diameter so as to be 30 capable of a slight swinging movement in a plane parallel to the face of the relatively stationary disk, means for limiting the extent of this swinging movement, an outwardly-extending arm secured to the periphery of 35 the pivoted disk said arm extending over and beyond the fulcrum-point, and a weight ad-

justable on said arm, substantially as described.

10. In a sound recorder and reproducer, the combination of the disk, A, having a tubular 40 section for connection to the trumpet, a disk, B, eccentrically pivoted to the disk, A, a coiled spring *h*, surrounding the pivot for affording a yielding connection, a diaphragm supported in the disk, B, a stylus-bar secured to the 45 said diaphragm and pivotally supported on the diaphragm-holding section and a recording-stylus secured to the lower end of the stylus-bar, substantially as described.

11. In a sound-box, the combination of a 50 rigidly-held disk adapted to be connected with a sound-conveying device, a smaller disk pivoted eccentrically on the rigid disk, a circular recess formed on the face of the rigid disk eccentric thereto, a circular flange formed on 55 the rear face of the smaller disk around a circular opening and concentric with said disk, said flange being of a diameter smaller than the circular recess and adapted to extend loosely therein, a diaphragm carried by the smaller 60 disk, a stylus-bar secured to said diaphragm and pivotally supported on the diaphragm-holding section, said stylus-bar being arranged at an angle on a diametrical line with the center of the smaller disk and its pivotal point, sub- 65 stantially as described.

In witness whereof I have hereunto set my hand this 18th day of January, A. D. 1900.

ELDRIDGE R. JOHNSON.

Witnesses:

JNO. T. CROSS,

BENJ. F. PERKINS.

722,417

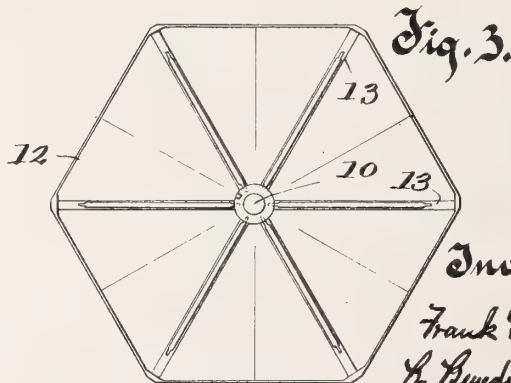
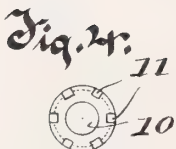
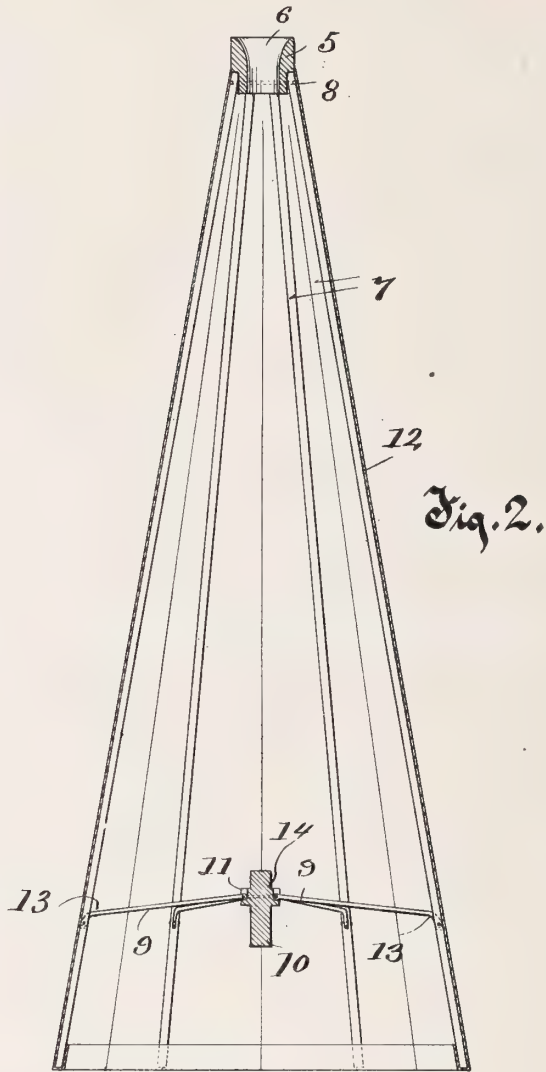
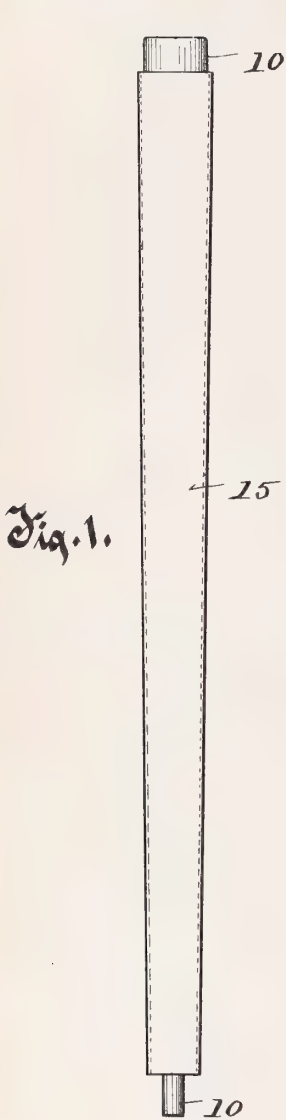
No. 753,417.

PATENTED MAR. 1, 1904.

F. E. MITCHELL.
MEGAPHONE.

APPLICATION FILED JULY 31, 1903.

NO MODEL.



Witnesses:

R. S. Caldwell.

Anna F. Schmidtbauer

Inventor.

Frank E. Mitchell

By Rudolph M. M. M. M.
Attorneys.

UNITED STATES PATENT OFFICE.

FRANK E. MITCHELL, OF OSHKOSH, WISCONSIN.

MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 753,417, dated March 1, 1904.

Application filed July 31, 1903. Serial No. 167,674. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. MITCHELL, residing at Oshkosh, in the county of Winnebago and State of Wisconsin, have invented a new and useful Improvement in Megaphones, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to certain new and useful improvements in megaphones, and has for its object to produce a megaphone that will be collapsible and of such a simple structure as to be suitable for advertising or campaign purposes.

Referring to the accompanying drawings, forming part of this description, Figure 1 is a plan view of the megaphone folded and inclosed in a suitable casing or covering. Fig. 2 is a longitudinal sectional view of the megaphone when distended for use. Fig. 3 is an end elevation of the device as shown in Fig. 2 looking toward the larger end thereof, and Fig. 4 is a detail plan view of the hub of the device.

In the drawings, 5 represents an annular mouthpiece provided with a flaring bore 6 and having pivoted thereto a number of ribs 7, which have their ends inserted in suitable slots at the edge of the mouthpiece, where they are confined by a wire 8 passing around the ribs and mouthpiece and embedded in grooves therein. Near their lower ends the ribs 7 have pivoted thereto stays 9, which are slightly bent outward near their pivots and are all pivotally connected to a center piece or hub 10 by having their ends inserted in suitable slots 11 about the periphery of said hub, where they are joined by a wire passing through perforations in their ends and through an annular groove in the hub connecting said slots. A covering 12, of paper, cloth, or other suitable material, is mounted on the ribs 7 and is secured thereto, preferably by gluing, with its edge turned over the ends of said ribs. The covering is of such a shape and size that when the hub 10 is raised to its highest position, as shown in Fig. 2, the ribs will be distended to give said covering a conical shape, and said hub will have just passed the posi-

tion of greatest resistance when the bends of the stays 9 bring their shoulders 13 into contact with the ribs and the inner end of said stays come into engagement with the end wall of the slots 11 to prevent any further inward movement of said hub 10, so that the conical formation will be preserved and the device will be operative as a megaphone.

When it is desired to collapse the megaphone, it is only necessary to draw outwardly upon the hub 10, bringing said hub beyond the point of greatest resistance and as far away from the mouthpiece as is possible, when the ribs 9 swing into the slots 11 and the ends of the ribs 7 pass into an annular rabbet 14 near the end of said hub. The covering between the ribs may now be rolled upon the framework and the entire device slipped within a suitable tubular casing 15, when the mouthpiece constitutes a handle and the outer reduced end of hub 10 forms a bearing-point for the device to be used as a cane or the like.

It is obvious that the entire invention may be easily constructed of cheap material which will be suitable for the objects mentioned and that the change from a megaphone to a cane, or vice versa, may be quickly made and that in either form the device is well adapted to accomplish its purpose.

What I claim as my invention is—

1. A megaphone comprising a foldable cover and pivoted means for distending said cover or permitting it to collapse.

2. A megaphone comprising a flexible cover and a pivoted ribbed distending means therefor capable of being collapsed.

3. A megaphone comprising a flexible cover, a ribbed frame on which the cover is mounted and means for holding the frame distended, said means being capable of folding to collapse the megaphone.

4. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub to which the stays are also pivoted, and a cover mounted on the ribs.

5. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub having slots in which the stays are also pivoted, said stays being adapted to bear on

the walls of the slots when the ribs are distended, and a covering mounted on the ribs.

6. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub to which the stays are also pivoted, shoulders on the stays to engage the ribs when said ribs are distended, and a covering mounted on the ribs.

7. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub having slots in which the stays are also pivoted, said stays being adapted to bear on the walls of the slots when the ribs are distended, shoulders on the stays to engage the ribs when said ribs are distended, and a covering mounted on the ribs.

8. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub to which the stays are pivoted, said hub having an annular rabbet in which the ends of

the ribs are seated when the megaphone is collapsed, and a covering mounted on the ribs.

9. A megaphone comprising a mouthpiece, ribs pivoted thereto, stays pivoted to the ribs, a hub to which the stays are pivoted, said hub having at one end an annular rabbet in which the ends of the ribs are seated when the megaphone is collapsed and having its other end reduced to form a projecting bearing-point for the device when collapsed, a covering mounted on the ribs, and a casing to contain the device when collapsed, the entire device when so arranged constituting a cane.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK E. MITCHELL.

Witnesses:

S. W. MURPHY,
J. E. RITTER.

754,313

No. 754,313.

PATENTED MAR. 8, 1904.

E. A. IVATTS.
PHONOGRAPH, &c.

APPLICATION FILED MAY 20, 1903.

NO MODEL.

Fig. 1.

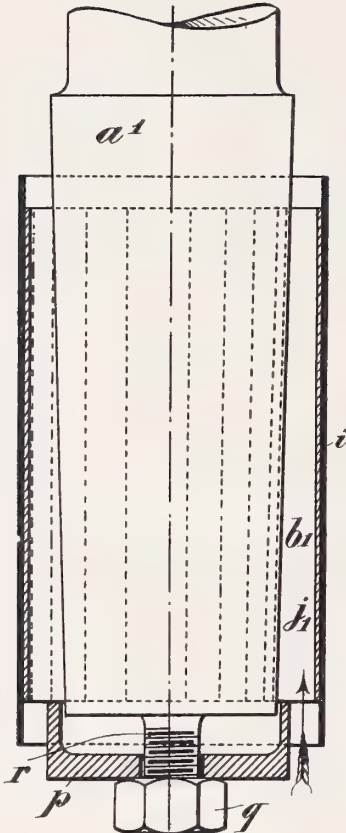


Fig. 3.

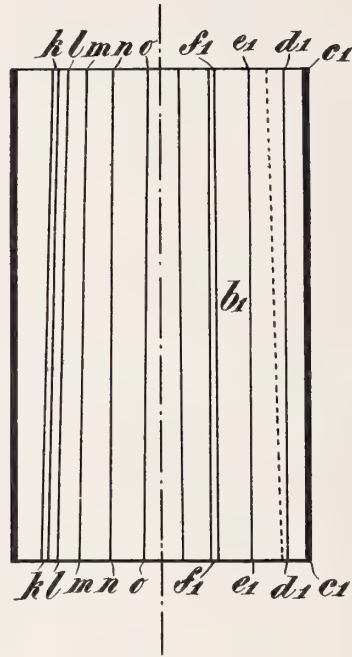


Fig. 2.

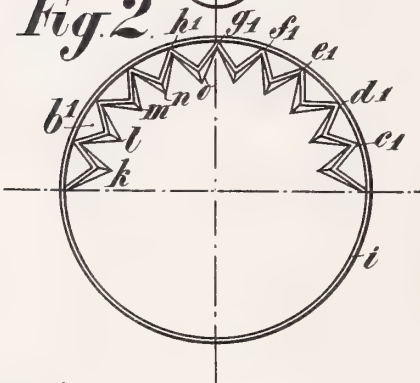
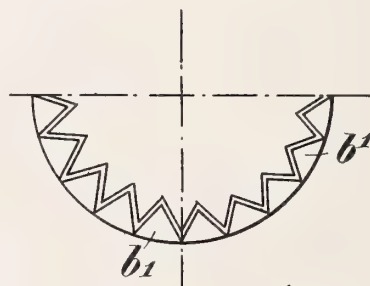


Fig. 4.



WITNESSES

Thos. Howe
Richard H. Tucker

INVENTOR

Ernest A. Ivatts
my J. M. Whitney
att'y

UNITED STATES PATENT OFFICE.

ERNEST ALBERT IVATTS, OF PARIS, FRANCE, ASSIGNOR TO COMPAGNIE GÉNÉRALE DE PHONOGRAPHES, CINÉMATOGRAPHES ET APPAREILS DE PRÉCISION, OF PARIS, FRANCE.

PHONOGRAPH, &c.

SPECIFICATION forming part of Letters Patent No. 754,313, dated March 8, 1904.

Application filed May 20, 1903. Serial No. 158,028. (No model.)

To all whom it may concern:

Be it known that I, ERNEST ALBERT IVATTS, a citizen of Great Britain, residing at Paris, in the Department of the Seine, France, have
 5 invented new and useful Improvements in and Relating to Phonographs and the Like, of which the following is a specification.

In phonographs with cylindrical records the records are generally fitted upon a conical
 10 mandrel. These records thus possess conical bores and are secured upon the conical mandrels by wedging. This method of fixing the records has the advantage that a great number of records may be used in connection with the
 15 same apparatus, but cannot be used with records of equal thickness throughout—that is, records with a cylindrical central bore.

This invention relates to an expansible inner sleeve for securing cylindrical records of
 20 phonographs in place upon the conical mandrel generally provided for this purpose. These records are of equal thickness throughout—that is, they are cylindrical inside as well as outside.

In the accompanying drawings, Figure 1 is a sectional elevation of a conical mandrel, ex-
 25 pansible sleeve, and cylindrical record. Fig. 2 is an end view of the record and one-half of the sleeve. Fig. 3 is a longitudinal sectional elevation of the sleeve. Fig. 4 is a half end
 30 view of the same.

In Fig. 1, *a'* is the central conical mandrel or plug of the phonograph or a piece mounted upon a rotating shaft. *b'* is the expansible
 35 integral sleeve with corrugations or grooves, which are produced by creasing or bending the tube in such a manner that the surfaces or outer edges of the ridges *c' d' e' f' g' h'* are in or come against a cylindrical internal surface, while the inner or outer edges of the
 40 ridges *k l m n o* are formed to engage with an external conical surface. The record *i* is placed upon the sleeve *b'*, which is then pushed upon the conical mandrel *a'* in the direction of
 45 the arrow *j'*, the creased or corrugated surfaces being thus subjected to deformation in

respect of height and width, the outer edges of the ridges being firmly pressed against the inner face of the record, and the inner edges of the ridges tightly embracing the conical
 50 surface of the mandrel. In Fig. 1, *p* is a cup-shaped disk by means of which the sleeve *b'* is pushed onto the cone *a'* by the agency of the nut *q* engaging with a screw *r*, forming a central extension of the mandrel *a'*. I do
 55 not limit myself to the employment of this expansible sleeve only for the purpose of fixing the record in place, but reserve the right to use it in any other manner—as, for example, for securing the records during the process
 60 of manufacture when they are undergoing polishing and turning.

The sleeve, as described, may be formed from any suitable material, and the ridges or
 65 corrugations may be pointed, rounded, or flat and of any suitable dimensions.

Having now particularly described and as-
 70 certained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. An expansible sleeve having longitudinal
 75 corrugations whose outer edges lie in a cylindrical plane, so as to engage with the inner surface of a cylindrical record, and whose inner edges lie in a conical plane, corresponding
 with and adapted to engage the external conical surface of the ordinary phonograph-mandrel.

2. The combination with a phonograph-mandrel having the usual conical taper, of a
 80 record having a cylindrical interior, and an expansible integral sleeve having a corrugated surface and adapted to be slid lengthwise into the annular space between the mandrel and the record, and firmly support the latter.

In testimony whereof I have signed my name to this specification in the presence of two sub-
 85 scribing witnesses.

ERNEST ALBERT IVATTS.

Witnesses:

AUGUSTUS E. INGRAM,
 HENRY DORNLEY.

No. 754,508.

PATENTED MAR. 15, 1904.

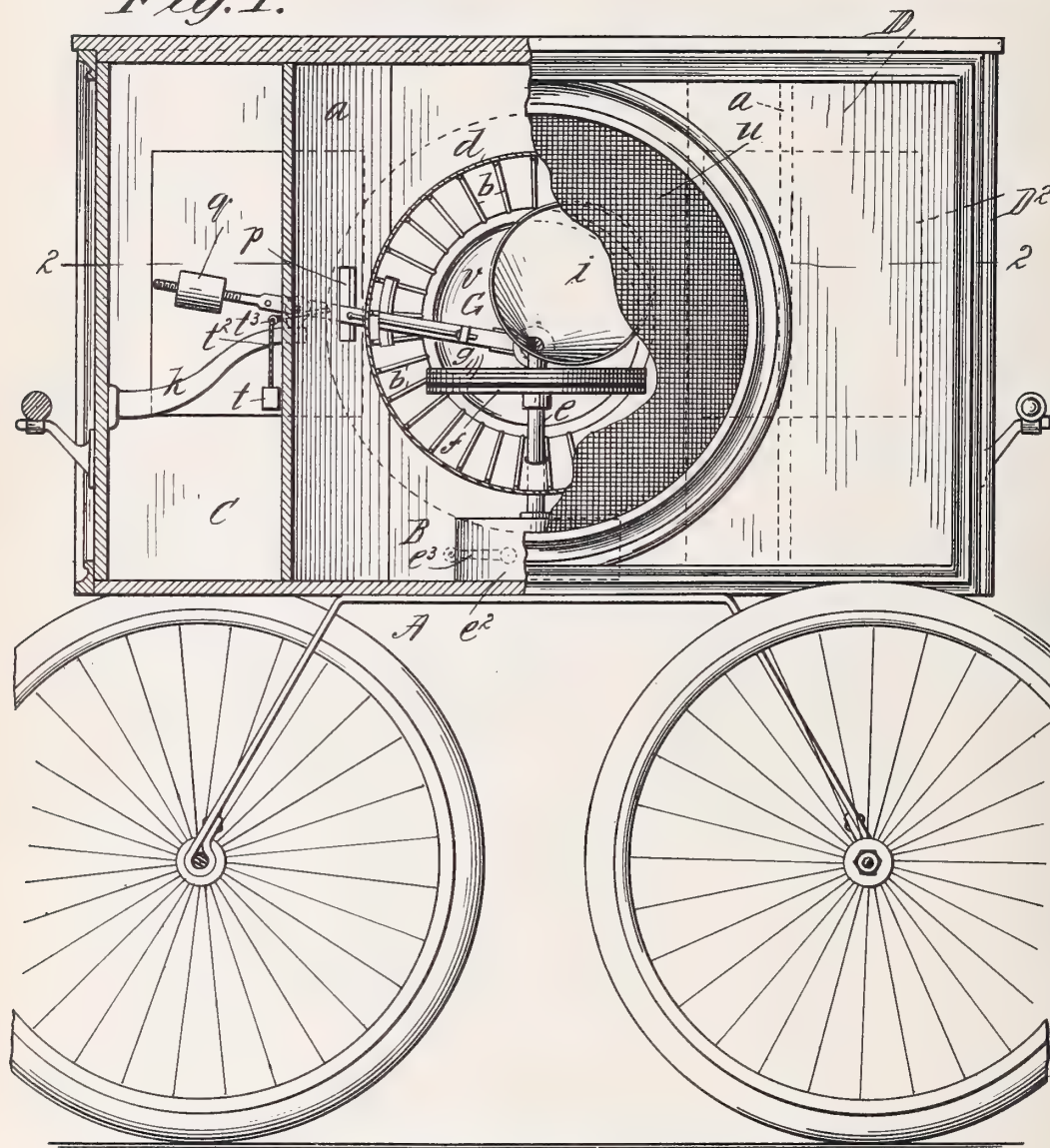
C. W. SKIFF & S. A. GRANT.
PHONOGRAPHIC APPARATUS.

APPLICATION FILED OCT. 18, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

J. D. Garfield
A. V. Leahy

Inventors:

Charles W. Skiff
Sidney A. Grant
by Wm. S. Bellows
Attorney

No. 754,508.

PATENTED MAR. 15, 1904.

C. W. SKIFF & S. A. GRANT.
PHONOGRAPHIC APPARATUS.

APPLICATION FILED OCT. 18, 1902.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 2.

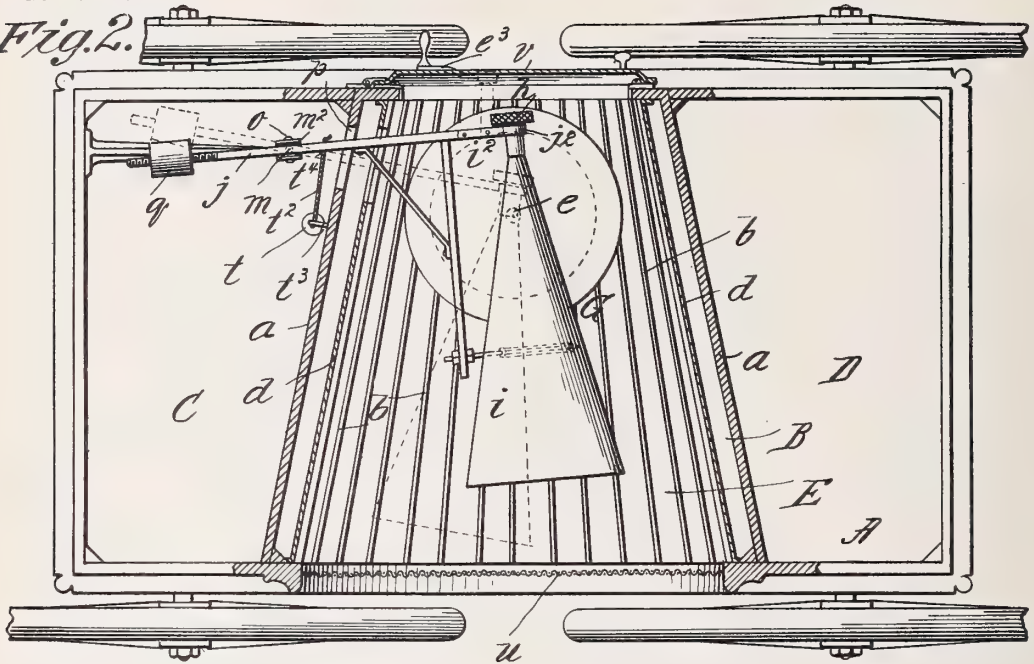
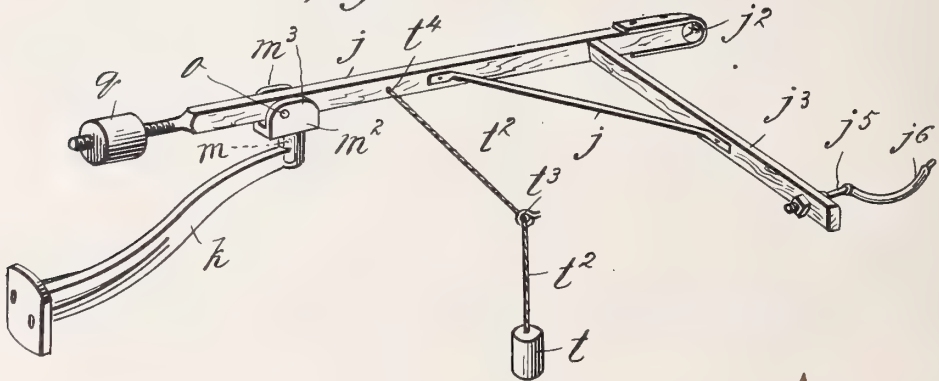


Fig. 3.



Witnesses:

J. W. Garfield
A. V. Leahy.

Inventor:

Charles W. Skiff
Sidney A. Grant.
by W. A. Bellona,
Attorney

UNITED STATES PATENT OFFICE.

CHARLES W. SKIFF, OF WESTFIELD, AND SIDNEY A. GRANT, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNORS TO THE UNITED STATES MUSIC MACHINE COMPANY, OF SPRINGFIELD, MASSACHUSETTS, A CORPORATION OF NEW JERSEY.

PHONOGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 754,508, dated March 15, 1904.

Application filed October 18, 1902. Serial No. 127,765. (No model.)

To all whom it may concern:

Be it known that we, CHARLES W. SKIFF, a resident of Westfield, and SIDNEY A. GRANT, a resident of Springfield, in the county of Hampden and State of Massachusetts, citizens of the United States of America, have invented certain new and useful Improvements in Phonographic Apparatus, of which the following is a full, clear, and exact description.

This invention pertains to a sound-reproducing apparatus, and more especially one which is mounted portably, so as to be used conveniently in different places, either for indoors or out of doors.

The apparatus of the present invention comprises a case or cabinet having therein the sound-reproducing mechanism, such as a graphophone or phonograph, and provisions and arrangements for the means amplified of voluminous sounding of the instrument, arrangement for the reception and employment successively of several "records;" and the invention comprises other and further constructions and combinations of parts, all as will hereinafter fully appear and be set forth in the claims, and for the carrying out of objects which will be hereinafter mentioned.

In the drawings the apparatus is shown as comprising and mounted on a carriage whereby it is adaptable for street use and transportable into houses with about the same convenience that a baby-carriage is.

Figure 1 is in part a front elevation and in part a vertical section longitudinally through the wheel-supported cabinet. Fig. 2 is a horizontal sectional view taken about on the line 2 2, Fig. 1. Fig. 3 is a perspective view of novel horn-supporting devices comprised in the present invention.

In the drawings, A represents a rectangular case or cabinet having intermediately thereof vertical partitions *a a*, which, as particularly shown in Fig. 2, are divergent from the rear to the front, thereby producing a forwardly-flaring central compartment B and end compartments C and D. Within the central com-

partments C is a frame of frusto-conical form constituted by a series of wires *b*, extending from the rear to the front walls of the cabinet and forming a manner of forwardly-flaring chamber, which may or not be completely inclosed, as by a covering, (indicated at *d*,) which may be gauze or sheet metal. This covering is a preferred provision, but not regarded as a necessity.

Located within the forwardly-flaring space E comprised within the plane constituted by the circularly-arranged and forwardly-divergent wires *b* is a graphophone, (indicated in a general way by the reference-letter G,) a preferred type of which sound-reproducing instrument is shown as comprising a vertical shaft *e*, having connection at the bottom of the chamber B with the usual motor *e*², for which *e*³ is the crank for winding it up and establishing a motor energy therein.

The rotatably-vertical shaft *e* has near its top a table *f*, which is rotatable as a part of the shaft, and upon this table may be superimposed a plurality of disk records, each being understood as having a central perforation to fit over the extremity of the shaft which is upstanding above the top of the table *f*.

h indicates the receiver or sound-reproducing device, understood as embodying therein a diaphragm and also embodying the usual pin or pointed stud, which engages into the minute indentations arranged around on the upper face of the record-disk in an involute line, as well known, the succession of indentations in such line causing the pointed stud to have a progression from near the margin of the record-disk toward and finally to near the center of the disk, the successions of indentations and intermediate full or unindented portions of the record imparting to the pointed stud the sound-producing vibrations whereby the diaphragm, through the horn *i*, connected therewith, becomes audibly effective, as well known.

It will be perceived that there is next to the receiver and in the line of the axis thereof a

nozzle or tubular section z^2 , which is also in the axial line and as a connected part of the horn, so that the vibration-produced sound from the diaphragm passes direct and straight out through the horn instead of having to reach the horn through a nozzle in the form of a quadrantal bend, as heretofore commonly employed in graphophones or "gramophones" using disk records.

Inasmuch as the position, as to its height, of the receiver h is in the use of the apparatus variable according as to whether only one or several of the record-disks are provided on the rotatable table is variable and as the receiver and the horn, which is to all intents and purposes connected thereto as a part thereof, are required to have movements toward the center of the disk in a slightly-curved line, which is, however, approximately radial to the center of the disk, we have provided the receiver and horn-support shown in the drawings, and the same consists of the lever-arm j , mounted to swing in a vertical plane on a stationary supporting-bracket k , said lever-arm also being swivel-connected with said bracket at m , so as to swing horizontally, and said lever-arm has at its one extremity the socket or eye j^1 , through which the horn-nozzle has a supporting engagement and, moreover, the lever has the right-angularly-extended member j^3 , trussed by the brace j^4 , and upon the extremity of this member j^3 is the supporting-arm j^5 of bowed form, which may be practicably composed of stiff heavy wire and preferably covered with a section j^6 of rubber tubing, an intermediate portion of the outwardly-widening horn resting in the hollow of the supporting-arm j^5 , which is in line with the socket-eye j^1 .

The peculiar connection between the lever j and the bracket k is constituted by forming an upwardly-opening socket in the extremity of the bracket, into which fits for rotational movement on a vertical axis a depending stud m of a member m^2 , which has the double up-standing ear-lugs m^3 , through which and through the intermediate portion of the lever the pivot o horizontally passes. The said bracket is shown as supported by being screwed to the end wall of the cabinet A near the rear wall, and the lever has its extremity projected through the aperture p in one of the partition-walls for supporting the horn, as shown.

q represents a counterbalance-weight, the same screw-threading on the end of the lever j which is farthest from the horn, this weight being adjustable, so that it may nearly but not quite overcome the weight of the phonographic devices carried by the other end of the lever and so that while the pointed stud of the receiver may impinge against the record with all requisite force of bearing it will, on the other hand, bear with an entire avoidance of gouging or record-impairing effect.

Although in this character of phonographic mechanism the receiver-stud is forced and consequently with it the receiver and horn are bodily forced inwardly toward the center of the record and the rate and extent of the inward feed is entirely regulated and controlled by the involution of the record-indentations, we, however, provide an assisting weight, operative upon the lever, so that the work of feeding the receiver and horn inwardly accomplished by the record-indentations is rendered measurably far less destructive on such indentations than would be the case in the absence of such auxiliary weight. The said weight is indicated at t and is suspended at the lower end of the cord t^2 , which has a running and guiding engagement through the eye t^3 and a connection at t^4 , a portion of the latter j inwardly beyond the point of swiveling at m of such lever, so that the tendency of said weight is such as to assist, as before mentioned, in swinging the lever and the parts thereon supported from the position shown by the full lines in Fig. 2 toward the position indicated by the dotted lines.

In the front of the flaring chamber indicated as comprised within the flaring frame extending from the rear to the front of the cabinet is provided a covering of gauze u by preference, the same not materially obstructing the egress of the sound, but serving the purpose of excluding dirt. The rear of such flaring chamber is covered by the hinged door v , which is so constructed as to constitute a diaphragm or sounding-board, the same being advantageously composed of sheet metal, parchment, or the like, and inasmuch as the sound-producing effects in the receiver are present at the rear thereof to as nearly a great extent as forward thereof this rear diaphragm has the effect of materially augmenting the volume of the reproduced selection to be emitted at the front of the cabinet. After one record has been employed and it is desired to use another of those placed one above the other on the rotatable table f the diaphragm-constituted door v is swung open at the rear of the cabinet, the horn and receiver elevated by tilting the lever, the last used record-disk is lifted off from the other disks thereunder and removed through the rear opening and may be stowed away in the compartment D, for which a door (indicated at D^2) is provided and the phonographic devices brought to juxtaposition with the next record-disk.

It will be perceived in the arrangement shown, more especially by Fig. 2, that this apparatus comprises in substance a horn within a horn—that is, the horn i of the phonograph proper is located within the flaring chamber which surrounds it and within the forward end of which chamber the forward end of the horn has its location, so that more effective audible results are acquired.

It will be perceived that the receiver and

horn-support, with the receiver and horn mounted thereon as described, enables during the rotation of the record-disk the relations between the horn and receiver to the support to be always constant, the whole supporting device being bodily movable both vertically and horizontally and with the utmost delicacy and with an entire avoidance of friction, and this device is materially advantageous over an arrangement wherein the receiver and horn are so mounted that they have during the playing of a selection swinging or oscillatory movements upon and relative to their support.

15 Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described a case or cabinet having an opening in its front and an opening in its rear, a door to close the rear opening, and a forwardly-diverging inclosure located in said cabinet and extending from the front opening to the door-closed opening.

25 2. In an apparatus of the character described, a case having an opening in its front and a removable diaphragm at its rear wall and having a space or compartment therein extending and divergent from rear to front, said removable diaphragm also forming a closure for the rear end of the compartment, for the purpose set forth.

3. In an apparatus of the character described, a case or cabinet having an opening in its front, and having therein an inclosure, the sides of which are composed of a series of circularly-arranged rods extending from the rear of the cabinet in forwardly-divergent lines to the front opening, and a diaphragm at the rear ends of the rods, substantially as described.

4. In an apparatus of the character described, a case having an opening in its front and having therein a forwardly-widening chamber leading to said front opening, and composed of a series of circularly-arranged forwardly-divergent rods extending from the rear to the front of the case having a covering supported thereby independent of the case.

50 5. In an apparatus of the character described, a phonographic-containing case having therein a forwardly-widening compartment or removable chamber, the rear wall of which is constituted by a vibratory diaphragm and having its front open, for the discharge of sound.

6. In an apparatus of the character described, a case having a front opening for the discharge of sound, a screen covering and protecting said opening, said case having therein, a forwardly-widening phonographic-containing compartment or chamber terminating at said screen-covered opening, and a vibratory door to close the rear end of the compartment.

65 7. A phonographic case, embodying a sound-

augmenting compartment which flares forwardly to an open front end for the discharge of sound, and a removable diaphragm forming a closure for the rear end of the compartment.

8. A phonographic case, embodying a sound-augmenting compartment which flares forwardly to an open front end for the discharge of sound, a foraminous cover for the open end of the compartment, and a removable diaphragm forming a closure for the rear end of the compartment.

9. In an apparatus of the character described, the combination of a flaring sound-augmenting compartment having a rear closed end and an open end for the discharge of sound, a removable diaphragm to close the rear end, a phonograph within the compartment, and a horn connected with the phonograph and disposed longitudinally within the compartment with its open front end disposed toward the open end of the compartment.

10. In an apparatus of the character described, the combination of a flaring sound-augmenting compartment having its larger end open for the issue of sound, a removable diaphragm forming a closure for the smaller end of the compartment, a phonograph within the smaller end portion of the compartment, and a horn within the compartment with its smaller end connected with the phonograph and its larger discharge end disposed toward the open end of the compartment.

11. In an apparatus of the class described, a case having a forwardly-flaring compartment with an open front end, a sound-augmenting chamber within the compartment, a removable resonating-diaphragm to close the rear end of the compartment and chamber and to permit access thereto, a phonograph, and a phonographic horn connected with the phonograph and arranged in the chamber with its open end disposed toward the open end of the chamber.

12. In an apparatus of the class described, a case or cabinet having forwardly-diverging partitions forming a forwardly-flaring compartment, a sound-augmenting chamber in the compartment, a removable diaphragm to close the smaller rear ends of the compartment and chamber, a phonograph in the compartment, and a horn within the chamber with its smaller end connected with the phonograph and its larger end disposed toward the open end of the chamber.

13. In an apparatus of the class described, a case or cabinet having forwardly-diverging partitions forming a forwardly-flaring compartment, an annular flaring augmenting-chamber within the compartment and extending from the front to the rear of the case, a removable resonating-diaphragm at the rear of the case to close the smaller ends of the compartment and chamber and to permit access thereto, a phonograph in the compart-

ment, and a horn within the chamber with its smaller end connected with the phonograph and its larger discharge end disposed toward the open end of the compartment.

- 5 14. In an apparatus of the class described, a case or cabinet having forwardly-diverging vertical partitions forming a central forwardly-flaring compartment and compartments at each end of the case, an annular forwardly-flaring sound-augmenting chamber in-
10 closed by the partitions, a diaphragm-door at the rear of the case to close the smaller rear

end of the chamber, a phonographic horn in the chamber having its larger discharge end disposed toward the open end of the chamber, 15 and a foraminous cover for the open front end of the central compartment and chamber.

Signed by us in presence of two subscribing witnesses.

CHARLES W. SKIFF.
SIDNEY A. GRANT.

Witnesses:

WM. S. BELLOWS,
A. V. LEAHY.

117-105

753,506

No. 755,506.

PATENTED MAR. 22, 1904.

Z. J. LE FEVRE.

DIAPHRAGM FOR SOUND PRODUCING INSTRUMENTS.

APPLICATION FILED JAN. 9, 1904.

NO MODEL.

Fig. 1

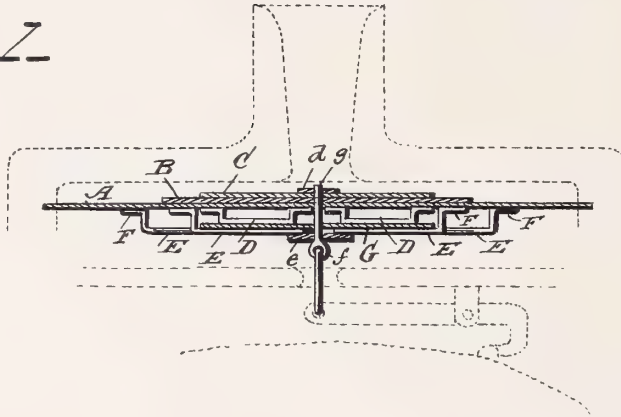


Fig. 2

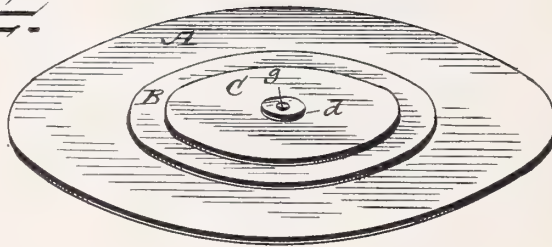


Fig. 3

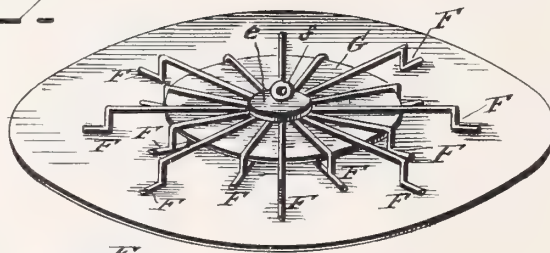
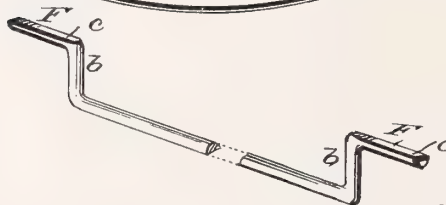


Fig. 4



Inventor

Zephire J. LeFevre.

By

Chas. W. Fowler

Attorney

Witnesses

W. Williamson
M. E. Moore

UNITED STATES PATENT OFFICE.

ZEPHIRE JOSEPH LE FEVRE, OF LOS GATOS, CALIFORNIA.

DIAPHRAGM FOR SOUND-PRODUCING INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 755,506, dated March 22, 1904.

Application filed January 9, 1904. Serial No. 188,349. (No model.)

To all whom it may concern:

Be it known that I, ZEPHIRE JOSEPH LE FEVRE, a citizen of the United States, residing at Los Gatos, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Diaphragms for Sound-Producing Instruments; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon.

The present invention has for its object to provide a diaphragm for sound-producing instruments especially adapted for use with the reproducers thereof and in which the diaphragm will possess increased strength, more volume of sound obtained with increased sweetness of tone over the instruments with the ordinary diaphragm; and the invention consists in a diaphragm constructed substantially as shown in the drawings, and hereinafter described and claimed.

Figure 1 of the drawings is a sectional elevation of my improved diaphragm, showing the reproducer-head and connections in dotted lines; Fig. 2, a perspective view of the upper side of the diaphragm; Fig. 3, a similar view of the under side thereof; Fig. 4, a detail perspective view of one of the radial braces, showing its flattened sides which come in contact with the disks.

In the accompanying drawings the diaphragm proper comprises three disks A B C of varying diameters and gradually decreasing in circumference from top to bottom, as shown more clearly in Fig. 2 of the drawings, said disks being preferably of mica of the required thinness. These three disks, as above described, are connected together by a suitable cement, one disk lying flat upon the other, and cemented to the under side of the larger disk are radial metal braces D E. (Shown in Figs. 1 and 3 of the drawings.) The several braces D E are flat upon that side which comes in contact with the disk, as shown in Fig. 4 of the drawings, whereby a perfectly firm and secure bearing for the disk is obtained and enabling

the radial braces to be conveniently attached thereto by suitable cement.

The radial braces D E have feet F at their ends, the upper sides thereof being flat, as shown at *a*, which form a bearing and come in contact with the disk A and are secured thereto by cement, as hereinbefore described, said feet connecting with the ends of the brace by angle-arms *b*, so that the feet will be on different horizontal planes with the braces.

The two sets of braces D E are of different lengths, so that the main disk or larger of the three will be equally braced with the others near its outer edge, the disk A having greater strength at its center by the disks B C, as said disks decrease in size, as shown in Fig. 2 of the drawings.

A reinforce-disk G, also of mica, is located between the two sets of radial braces D E, and the contacting surfaces of the braces are flattened, as shown at *c* in Fig. 4 of the drawings, so that the disk will have a firm support and enable the braces to be firmly secured thereto by suitable cement, thereby providing a perfect reinforce to the disk A without destroying its sensitiveness.

A small aluminium washer *d* is placed upon the top of the disk C, and a thin wire *g* extends through the several disks and connects with the washer, and a second washer *e* covers the ends of the braces E to securely hold them to the disk G, and through this disk the wire extends and has an eye *f*, by which it may be connected to the usual reproducer-lever by suitable link.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A diaphragm for sound-producing instruments, comprising a plurality of disks of suitable material and of gradually-diminished diameters secured together, one lying flat upon the other, a plurality of radial braces having its outer ends secured to the larger one of the disks, and a reinforce-disk located between the radial braces and secured thereto, substantially as and for the purpose set forth.

2. A diaphragm for sound-producing in-

struments comprising a plurality of disks of gradually-diminished diameters, one lying flat upon the other and secured together, two sets of radial braces each set being of different
5 lengths and having feet with flat surfaces which are secured to the under side of the larger one of the plurality of disks, and a reinforce-disk located between the two sets of braces, said braces having their surfaces which

come in contact with the reinforce-disk formed flat to facilitate connecting them thereto, substantially as and for the purpose described. 10

In testimony whereof I affix my signature in presence of two witnesses.

ZEPHIRE JOSEPH LE FEVRE.

Witnesses:

J. A. TUDOR,

J. D. FARWELL.

715247.

No. 756,289.

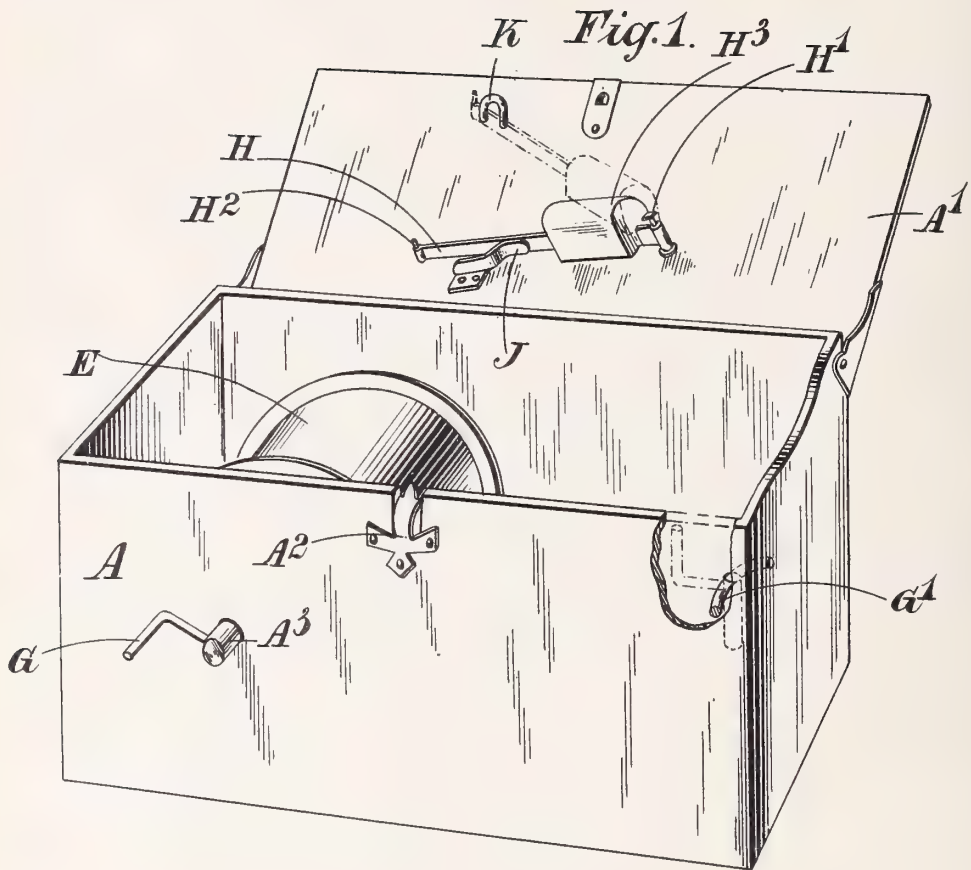
PATENTED APR. 5, 1904.

W. C. RUNGE.
GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

APPLICATION FILED JAN. 16, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses.
G. W. Freeman
J. M. Gillman, Jr.

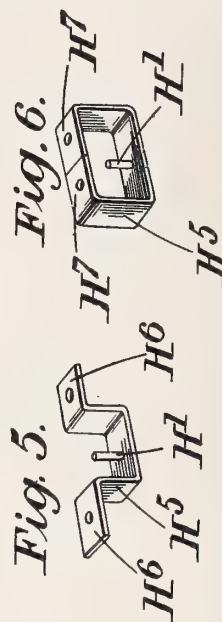
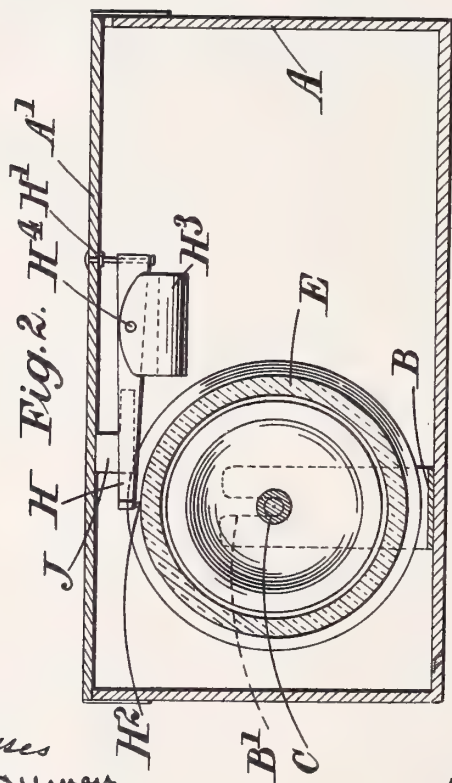
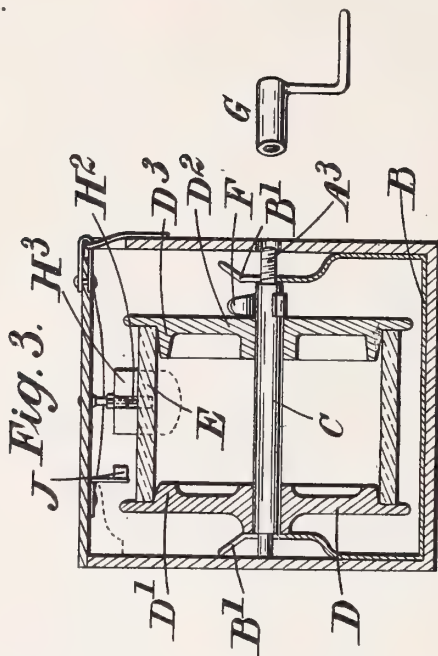
Inventor
by Walter C. Runge
Foster Freeman & Watson
Attorneys.

W. C. RUNGE.
GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses
G. M. Freeman
Am. Mfg. Co.

Inventor
Walter C. Runge
John Freeman Watson
Attorneys.

No. 756,289.

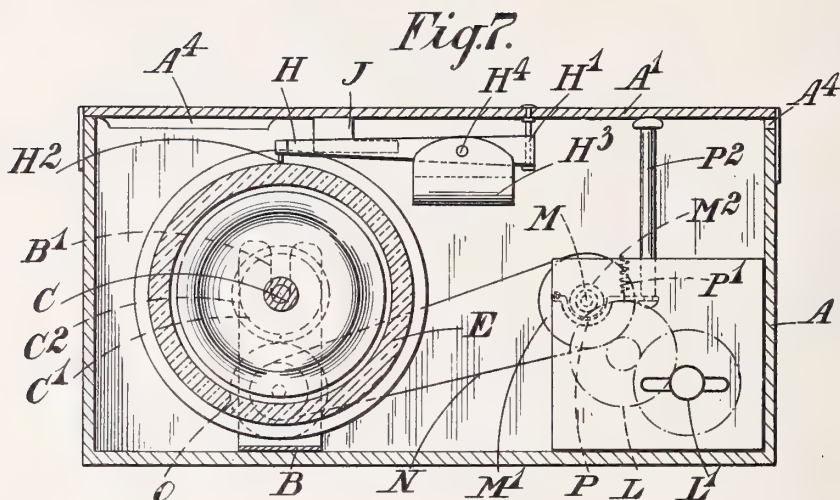
PATENTED APR. 5, 1904.

W. C. RUNGE.
GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

APPLICATION FILED JAN. 15, 1904.

NO MODEL.

3 SHEETS—SHEET 3.



Witnesses
G. M. Freeman
H. G. Freeman Jr.

Inventor
by Walter C. Runge
John Freeman & Watson
Attorneys.

UNITED STATES PATENT OFFICE.

WALTER C. RUNGE, OF LONDON, ENGLAND, ASSIGNOR TO THE TALKO-PHONE SYNDICATE, LIMITED, OF WESTMINSTER, ENGLAND.

GRAPHOPHONE, PHONOGRAPH, OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 756,289, dated April 5, 1904.

Application filed January 15, 1904. Serial No. 189,159. (No model.)

To all whom it may concern:

Be it known that I, WALTER C. RUNGE, a citizen of the United States, residing at London, England, have invented certain new and useful Improvements in Graphophones, Phonographs, or the Like, of which the following is a specification.

This invention relates to graphophones, phonographs, and the like, and has special reference to instruments suitable for use as toys.

The object of the invention is to construct a toy graphophone which, although very cheap to manufacture, will be efficient in operation and will not readily get out of order. The construction of the instrument is such that the records can be readily changed, and the parts are so disposed that the instruments may be transmitted from place to place without risk of damage.

In graphophones according to this invention the record-cylinder is mounted in a box, preferably of light wood, and the spindle supporting it is turned either by means of a handle which may conveniently be removable and which passes through an opening in the side of the box or by a motor in the box—for instance, a clockwork-train which is automatically started by the closing of the box. The lid of the box is hinged, and on the inside of it a lever or arm is loosely pivoted. The free end of this lever or arm carries a stylus, conveniently in the form of a piece of glass drawn to a point, and upon the lever may be pivoted a weight which when the instrument is in use keeps the point of the stylus in the grooves of the record and also tends to act as a "floating fulcrum" for the lever. When the lid is closed, the stylus rests upon the record-cylinder and travels along in the groove thereon when the handle is turned. The vibrations imparted to the stylus are transmitted to the lid of the box, which acts as a diaphragm, and the rest of the box acts after the manner of a resonating-chamber or sound-box. A pivoted hook or catch is provided on the inside of the lid and is so placed that when it is desired to move the instrument about or send it from place to place the stylus-carrying arm can be

retained by the hook and be kept up against the inside of the lid, thus preventing accidental damage to the record. At the lower part of the inside of the lid a stop is provided, so that when the stylus-arm is free from its retaining-hook and the lid is open the arm falls against the stop and when the lid is shut automatically takes up a position corresponding approximately to the starting-point of the groove on the record-cylinder. The record-carrying spindle is provided with two disks, each furnished with a coned shoulder. One of the disks is fixed on the spindle and the other is arranged to slip onto it and is secured, say, by a spring-clip or in any other convenient way, so that it may be readily taken off and the record, which is normally held between the two coned shoulders, removed and another one substituted.

In the accompanying drawings, Figure 1 is a perspective view with a portion broken away, showing one construction of graphophone according to this invention. Fig. 2 is a central longitudinal section through the box with the lid closed and the parts in their operative positions. Fig. 3 is a transverse section through the center of the record-mandrel. Fig. 4 is a perspective view of a spring-clip used to hold the removable disk in its place. Figs. 5 and 6 illustrate alternative constructions of one of the details of the instrument, and Fig. 7 shows in section a motor-driven graphophone also according to this invention.

Like letters indicate like parts throughout the drawings.

With reference first to Figs. 1 to 6, A is a box, preferably of light fairly strong material—say thin wood. It is furnished with a hinged lid A' and provided with a spring-catch A² to keep the lid closed when the instrument is in operation. Secured to the inside of the box is a strip B, having upwardly-projecting ends, slotted, as at B', to form bearings for a spindle C. On this spindle is a fixed disk D, having a coned shoulder D', and a similar disk D² is arranged to slip loosely over the spindle and is furnished with a coned shoulder D³. The record-cylinder E is held between the

disks D and D² and is centered on the coned shoulders. The removable disk D² is held in place by means of a spring-clip F, which grips the spindle C and is shown separately in Fig.

4. The end of the spindle C is screwed to take a removable crank-handle G, which is inserted through a hole A³ in the side of the box. On the inside of the lid A' is an arm H, loosely pivoted on a pin H', secured to the lid. This arm carries at its free end a stylus-point H², and when the lid is closed, as shown in Fig. 2, the stylus rests upon the record-cylinder E and works in the groove thereon. The arm H carries a weight H³, pivoted to it, as at H⁴, and this weight is found to act as a floating fulcrum and to increase the effect of the vibrations imparted to the lid A' through the arm H. A stop J is mounted on the lid A' in such a position that when the lid is open, as shown in Fig. 1, the stylus-carrying arm H falls against it and is then in such a position that when the lid is closed for the operation of the instrument the stylus is in a position corresponding approximately to the commencement of the groove on the record-cylinder. A hook or catch K is mounted on the inside of the lid A' and can be turned so as to engage with and retain the stylus-arm H when it is desired to send the instrument from place to place. This position of the hook K and stylus-arm is shown in dotted lines in Fig. 1. Accommodation for the removable handle G is provided at one corner of the box and is shown in Fig. 1 as a staple or socket G'.

Figs. 5 and 6 show alternative constructions of the support for the end of the stylus-arm H. In Fig. 5 the pin H' is attached to a strip H, provided with outwardly-bent lugs H⁶, by which it may be attached to the lid A', and in Fig. 6 the lugs H⁷ of the strip are shown bent inwardly, so that the point of attachment is nearer the center of the pin H'.

When it is desired to change a record, the handle G is first unscrewed from the spindle C and that spindle, with the disks and record, is lifted out from its bearings B'. The clip F is then removed, the disk D² slipped off, and a new record put in place of the old one. On replacing the disk D² and spring-clip F the record and its spindle can be reinserted in the box and the handle G screwed on again, when the instrument is ready for use.

The graphophone shown in section in Fig. 7 is substantially similar to the instrument already described, except that instead of the handle G for turning the record-carrying spindle C by hand a motor is provided. This is shown diagrammatically in the form of a clockwork-train L, driven from a spring which can be wound up by a key L'. This train drives a spindle M, upon which a similar pulley M' is mounted, and this pulley drives, through a light belt N, a pulley O, rotatably mounted on the bearing-strip B. The record-

carrying spindle C is provided with a pulley C', having a friction-surface C², formed, say, by a band of soft rubber, and when the record-spindle is in place in its bearing B' this is brought into frictional engagement with the pulley O. Preferably the clockwork-train is started and stopped automatically by the closing and opening of the lid, and this is conveniently accomplished by providing the spindle M with a brake-pulley M², against which a pivoted brake-lever P is brought when the lid is opened through the action of a spring P'. When the lid is closed, a rod P², projecting upward from the free end of the brake-lever P, is depressed and releasing the brake-pulley M² allows the clockwork-train to start and to rotate the record-carrying spindle.

A separate starting and stopping mechanism may be provided instead of the automatic device, if desired.

In graphophones according to this invention it is found to be desirable to make openings in the containing-box. Such openings are shown at A⁴ in Fig. 7, and it will be understood that the construction illustrated in Figs. 1 to 6 may also be furnished with them.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A graphophone comprising a box, a record mounted within the box, a lid to the box adapted to act as a diaphragm, a stylus-carrying arm pivoted to said lid and disposed so that when the lid is closed the stylus rests in an operative position upon the record and means for rotating the record.

2. A graphophone comprising a box, a record mounted within the box, a lid to the box adapted to act as a diaphragm, a stylus-carrying arm pivoted to said lid and disposed so that when the lid is closed the stylus rests upon the record, a weight pivoted to said arm and means for rotating the record.

3. A graphophone comprising a box, slotted bearings within said box, a spindle mounted in said bearings, record-supporting disks upon the spindle, a record, a lid to the box adapted to act as a diaphragm, a stylus-carrying arm pivoted to said lid and disposed so that when the lid is closed the stylus rests in an operative position upon the record, and means for rotating the record-carrying spindle.

4. A graphophone comprising a box, slotted bearings within said box, a spindle mounted in said bearings, record-supporting disks upon the spindle, a record, a lid to the box adapted to act as a diaphragm, a stylus-carrying arm pivoted to said lid and disposed so that when the lid is closed the stylus rests in an operative position upon the record, a stop to automatically determine the starting position of the stylus-arm, and means for rotating the record-carrying spindle.

5. A graphophone comprising a box, slotted bearings within said box, a spindle mounted

in said bearings, record-supporting disks upon
the spindle, a record, a lid to the box adapted
to act as a diaphragm, a stylus-carrying arm
pivoted to said lid and disposed so that when
5 the lid is closed the stylus rests in an operative
position upon the record, a stop to automati-
cally determine the starting position of the
stylus-arm, a retaining-catch to hold the arm
out of engagement with the record, a motor
10 within the box, operative connections between
the motor and the record-carrying spindle

and means whereby the motor is automatically
started and stopped by the closing and open-
ing of the lid.

In testimony whereof I have signed my name 15
to this specification in the presence of two sub-
scribing witnesses.

WALTER C. RUNGE.

Witnesses:

ARCHD. J. FRENCH,
HARRY B. BRIDGES.

757,322

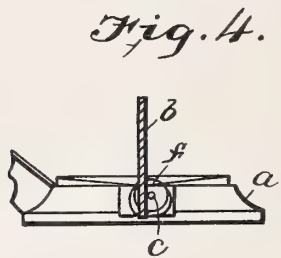
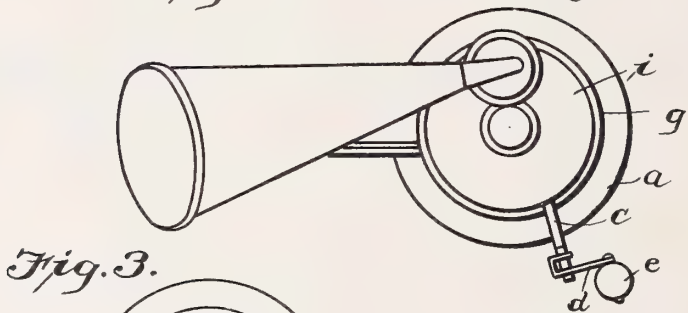
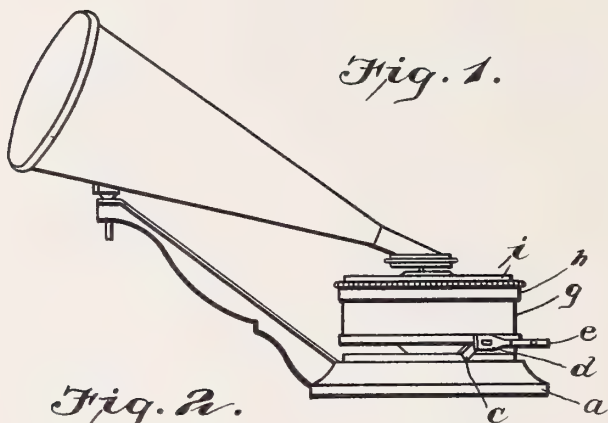
No. 757,322.

PATENTED APR. 12, 1904.

T. LHOTA.
PHONOGRAPH.

APPLICATION FILED JULY 1, 1903.

NO MODEL.



Witnesses

J. P. Brett
L. J. Heimick

By

Inventor
Theodor Lhota
By *G. Littman*
Attorney

UNITED STATES PATENT OFFICE.

THEODOR LHOTA, OF VIENNA, AUSTRIA-HUNGARY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 757,322, dated April 12, 1904.

Application filed July 1, 1903. Serial No. 163,975. (No model.)

To all whom it may concern:

Be it known that I, THEODOR LHOTA, a subject of the Emperor of Austria-Hungary, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Phonographs, more especially toy phonographs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in toy phonographs.

The improvement consists in the rotary disk that supports the phonogram-plate being made in the form of a hollow body—for example, a box or drum. This is of advantage in connection with the sounding effect. The cover of the hollow body may be made removable, so that it may also be used for storing the phonogram-plates or in the case of toy phonographs as a receptacle for articles of confectionery or the like. The hollow body may be rotated in the manner hitherto employed in connection with the rotary disks of small phonographs—viz., by means of a crank-shaft which is fixed to the vertical shaft. It is desirable that the crank-shaft should be mounted horizontally in the arrangement, as shown by way of example in the accompanying drawings of the phonograph.

Figure 1 is a side view of the phonograph; Fig. 2, a plan of the same; Fig. 3, a plan of the base of the phonograph; Fig. 4, a vertical section through the same.

The vertical spindle *b* is fixed in the middle of the base *a*, Figs. 3 and 4. The crank-shaft *c* is mounted horizontally or somewhat obliquely to or in the base of the phonograph and is actuated by the crank-arm *d*, fixed thereon and provided with a rotary handle *e*. At the other end of the crank-shaft is the disk *f*. On the spindle *b* the box *g* is placed and has a hole in the middle of the bottom and a central tube, by means of which the necessary guiding of the rotary box is insured. The cover *h* of this box, on which the phonogram-plates are laid, has an elevation in the middle which enters a central hole of corresponding

size in the plates, and thus keeps them in position. The box *g* is arched somewhat at the bottom. The box is rotated by means of the disk *f*, which is composed of india-rubber or the like, and when the crank-shaft is rotated rotates the box around the spindle *b* through friction. The plate *i* rotates with the box, and in consequence of this the recording-pin slides uniformly over the spirally-arranged sound-grooves without meeting with any resistance.

It will be seen that the hollow body *g*, with its cover *h*, can be most conveniently used as a receptacle, besides which it acts in the simplest manner as a rotary disk, which, however, would not be the case if the rotary crank-shaft were arranged vertically on the cover.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. As an improved article of manufacture, a support for a phonograph-plate comprising a rotatable hollow body in the form of a box or drum and a removable cover for said body on which the plate is designed to rest.

2. As an improved article of manufacture a support for a phonograph-plate, comprising a rotary hollow drum, arched at its lower end, and a removable cover for said drum, as set forth.

3. As an improved article of manufacture a support for a phonograph-plate, comprising a rotary hollow drum arched at the bottom, and a removable cover for said drum having means to enter the holes in the plates and keep them in position within the drum.

4. The combination with the foot-piece and a vertical spindle mounted therein, of a hollow drum on said spindle, a horizontal crank-shaft, means for actuating the same, and means on said crank-shaft and movable therewith for frictionally revolving the said drum about its spindle, as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

THEODOR LHOTA.

Witnesses:

ALVESTO S. HOGUE,
AUGUST FUGGER.

No. 757,867.

PATENTED APR. 19, 1904.

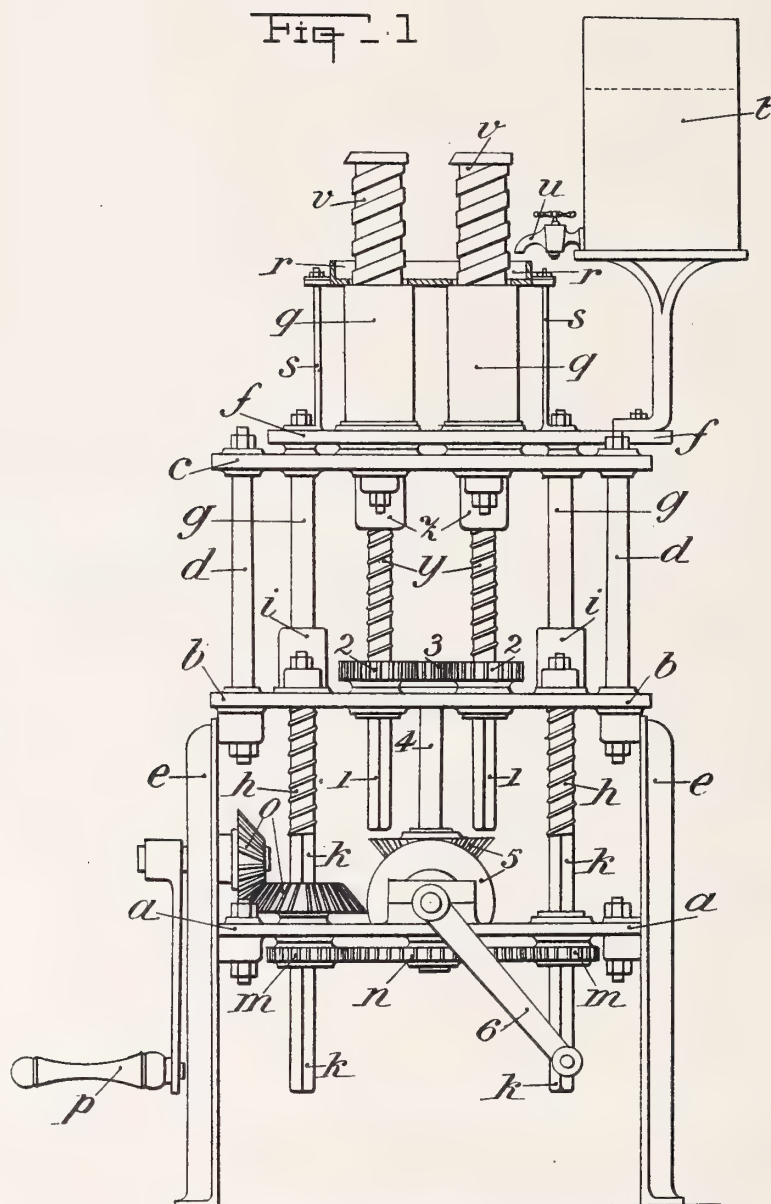
A. HAMON.

APPARATUS FOR CASTING CYLINDERS FOR PHONOGRAPHS OR THE LIKE.

APPLICATION FILED OCT. 31, 1903.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

James L. Norris, Jr.

C. S. Kesler,

Inventor

Augustin Hamon

By

James L. Norris,

Atty.

No. 757,867.

PATENTED APR. 19, 1904.

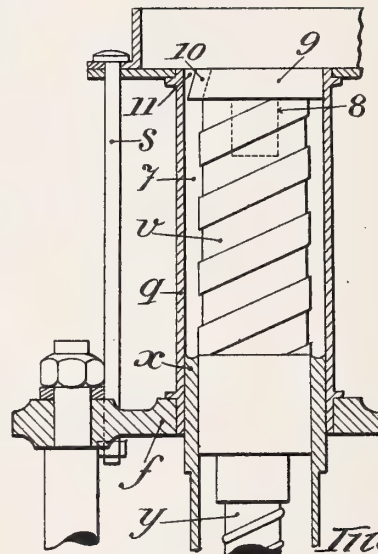
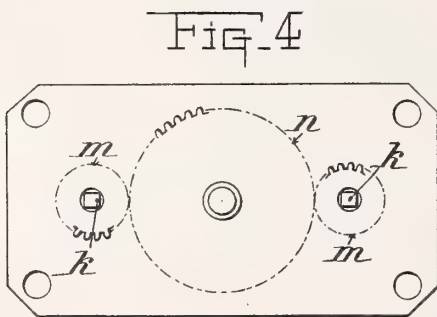
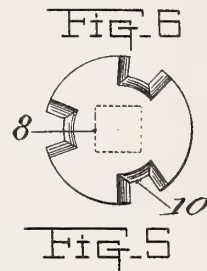
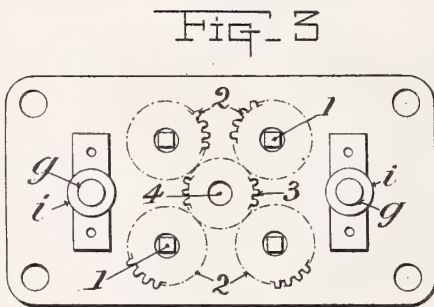
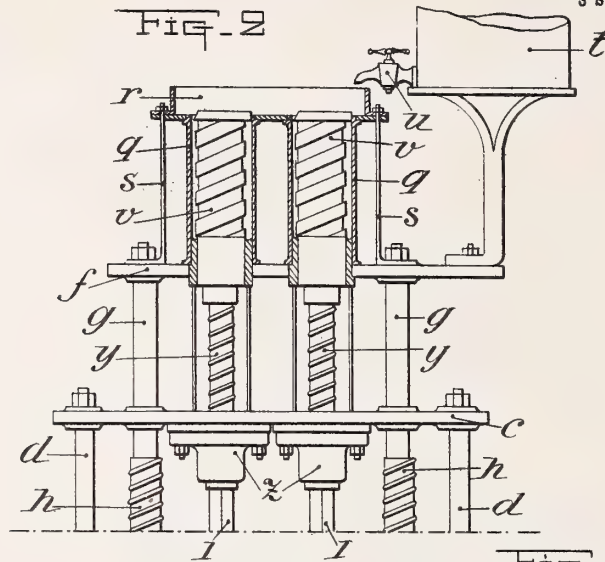
A. HAMON.

APPARATUS FOR CASTING CYLINDERS FOR PHONOGRAPHS OR THE LIKE.

APPLICATION FILED OCT. 31, 1903.

NO MODEL.

3 SHEETS—SHEET 2.



Witnesses:

James L. Norris, Jr.
C. D. Kessler.

Inventor
Augustin Hamon
James L. Norris
Atty.

757,867

No. 757,867.

PATENTED APR. 19, 1904.

A. HAMON.

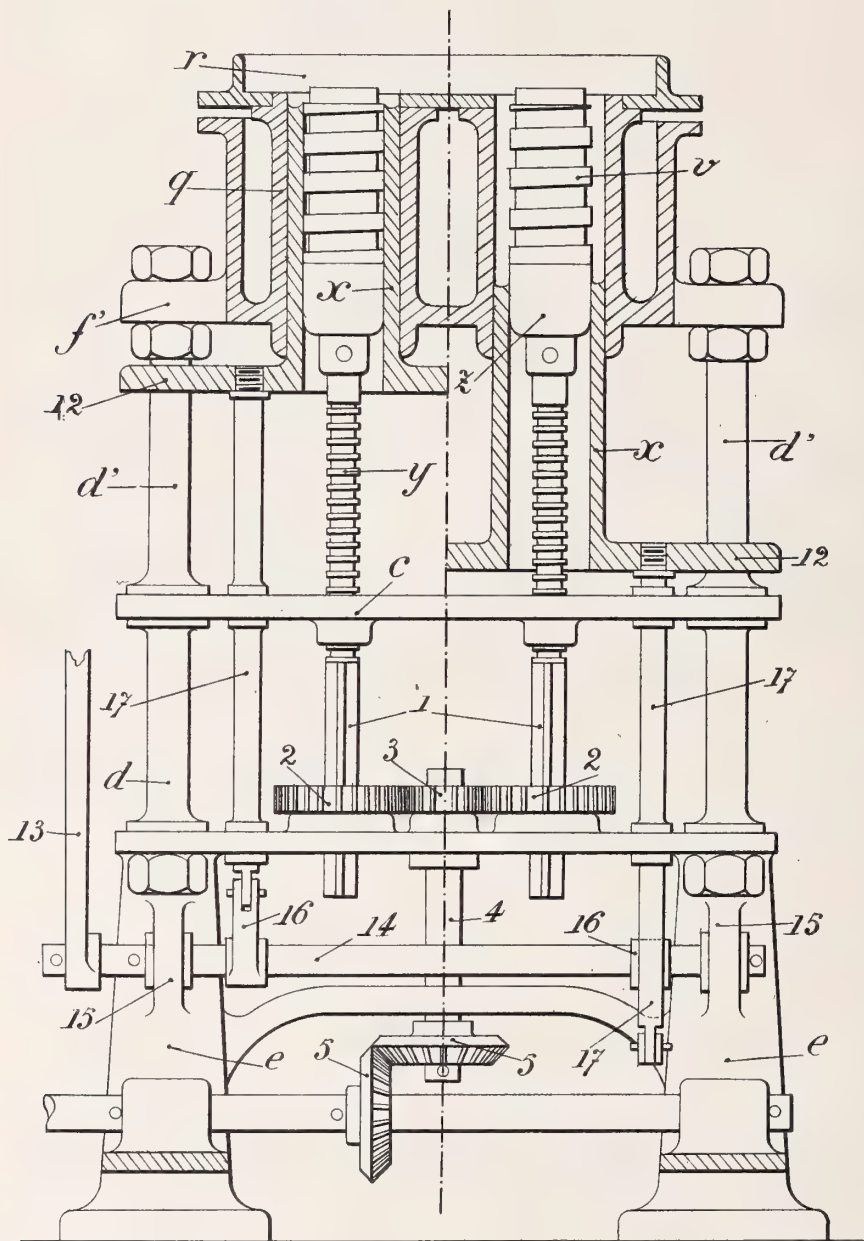
APPARATUS FOR CASTING CYLINDERS FOR PHONOGRAPHS OR THE LIKE.

APPLICATION FILED OCT. 31, 1903.

NO MODEL.

3 SHEETS—SHEET 3.

FIG. 7



Witnesses:

W. E. Keedy

Phet Everett

Inventor:

Augustin Hamon

By James L. Norris

Atty.

UNITED STATES PATENT OFFICE.

AUGUSTIN HAMON, OF NEUILLY-SUR-SEINE, FRANCE.

APPARATUS FOR CASTING CYLINDERS FOR PHONOGRAPHS OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 757,867, dated April 19, 1904.

Application filed October 31, 1903. Serial No. 179,335. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN HAMON, a citizen of the French Republic, residing at 9 Rue Garnier, Neuilly-sur-Seine, France, have invented certain new and useful Improvements in Apparatus for Casting Cylinders for Phonographs or the Like, of which the following is a specification.

This invention relates to apparatus for casting cylinders for phonographs, gramophones, and the like, and has for its object to enable a number of cylinders to be manufactured simultaneously in one apparatus and to produce such cylinders of a regular thickness and density and entirely free from air-holes.

To this end and according to this invention the apparatus comprises a series of four or more molds carried by a table and capable of being reciprocated vertically in a suitable frame, said molds being surmounted by a dish or tray containing the molten wax or other material of which the cylinders are to be made.

A series of cores and tubes or sockets, the upper edges of which form the bottoms of the molds, are provided corresponding in number to the molds, one being arranged concentrically within each mold, each core being provided with a helical groove or its equivalent.

A rotary movement and a rectilinear movement may be simultaneously imparted to the cores by any suitable mechanism, and the cylinders are cast by the relative displacement of the molds and said cores.

In order that my invention may be fully understood, I shall now describe the same with reference to the accompanying drawings, of which—

Figure 1 is a side elevation of one construction of the apparatus, showing the position of the several parts before the casting operation. Fig. 2 illustrates the upper part of the apparatus, showing the respective position of the molds and cores after the casting operation. Fig. 3 is a plan view of the core-operating gear. Fig. 4 is a plan view of the mold-operating gear. Fig. 5 shows, on an enlarged scale, one of the molds with its core in its respective position after the casting operation. Fig. 6 is a top view of a cap placed on the core, the purpose of which is to automatically sep-

arate the cast cylinder from the wax remaining in the tray. Fig. 7 is a side elevation, with sectional parts, of a modified form of the apparatus.

Referring first to Figs. 1 and 2, the apparatus comprises three stationary tables *a b c*, rigidly secured together by means of bolts *d* and posts *e*, forming part of the frame of the apparatus. A movable table *f* is provided, which is carried on two vertical rods *g*, having a threaded part *h*, which fits into a nut *i*, secured to the table *b*, said rod ending in a square part *k*, capable of sliding in corresponding square holes provided in the boss of two pinions *m*, secured to the lowermost table *a*. The pinions *m* mesh with a central gearing-wheel *n*, Figs. 1 and 4, and these wheels are operated from the crank *p* and bevel-wheels *o o*. When the pinions *m* are rotated, a rotary movement simultaneously with a longitudinal movement is imparted to the rods *g* and *h*, so that the table *f* will rise or fall as the pinions are rotated in one or the other direction. On the table *f* are placed the molds *q*, which may be four in number, and over these molds is a tray *r* for the molten wax, said tray being secured to the table *f* by means of the bolts or tie-rods *s*. On one side of the table *f* is secured a support on which rests a receiver *t* for the wax and means for melting this substance, which may be delivered into the tray *r* through the cock *u*. Concentrically to the molds are arranged the cores *v*, the outer surface of which is provided with helical grooves, which are intended to form the inner helical ribs generally used in phonograph-cylinders and also to enable the cores of being easily removed from the cylinders when cast without any risk of breaking the same. Each of these cores is guided in a socket *x*, which forms the bottom of the mold, Fig. 5, and said cores extend downward in the form of threaded rods *y*, fitting into nuts *z* on the table *c*, and the threaded rods end in the same manner as the rods *h* in square rods 1, adapted to slide in square holes in the boss of pinions 2 on the table *b*. These pinions, which are four in number, mesh with a central gearing-wheel 3, secured to the upper end of a vertical shaft 4, to which a rotary movement may be imparted by means

of bevel-wheels 5 and crank 6. In this manner a rotation is simultaneously imparted to the four cores, and in order to allow the latter of being unscrewed from the cylinders the pitch of the helical grooves of the cores is the same as that of the threads y .

One of the features of this invention consists in providing each core at its upper end with a square hole, in which engages the square tail end 8 of a cap 9 to be placed upon the core. Said caps 9, Fig. 6, are formed with a series of peripheral notches 10, having sharp edges for the purpose of separating the cast cylinder from the wax remaining in the tray, as will be hereinafter explained.

The apparatus works as follows: The operator first places the apparatus in the position shown by Fig. 1, in which the movable table f is lowered and rests on the stationary table c , while the cores v are raised. The cock u is then opened, and melted wax contained in the receiver t is allowed to flow into the tray r . The crank p is then turned so as to raise the table f , with the molds g , which are going to surround the cores. The liquid substance contained in the tray fills the space which becomes formed between the molds and the cores, and in this manner the cylinders are cast. It is understood that by this means no air-bubbles are formed, and consequently there are no air-holes in the finished cylinder, as often occurs with the casting processes hitherto in use. After the wax is sufficiently cooled the crank 6 is rotated in a suitable direction to lower the cores and unscrew the same from the cylinders; but at the beginning of the rotation the sharp edges of the caps act to separate the cylinders from the wax which remains in the tray, and at the same time these sharp or cutting edges cut clean the upper parts of the cylinders. When the cores are completely lowered, the cylinders, with the caps, are removed from the molds in any convenient manner. The cores are then raised in the position shown in Fig. 1, and the apparatus is ready for the next operation.

This apparatus also may be built up in the modified form shown in Fig. 7 without departing from the principle of the present invention, the sole difference being that the molds are held stationary and that the movable parts of the apparatus are the cores and the sockets which form the bottom of the molds. In this figure the same references are used as in the foregoing figures. The molds g , which support the tray r , are mounted on the table f' , which in this case instead of being movable is stationary and is rigidly secured to the table c by means of the bolts d' or posts. The cores v , which are movable concentrically to the molds, are secured to the upper end of threaded rods y with square parts 1, and they can receive a simultaneous rotary movement and longitudinal movement from the gear 2 3, operated by the shaft 4 and

bevel-wheels 5. The sockets x , which form the bottom of the molds, are in form of sleeves adapted to fill the free space between the molds and the cores, and they are secured to or in one piece with a movable table 12, to which up-and-down movements may be imparted by any convenient mechanism. This may be effected, for example, by supporting said table 12 on stay-rods 17, which are guided vertically in the table c and attached at their lower end to the levers 16, keyed on a shaft 14, supported in bearings 15 of the frame e of the machine, a hand-lever 13 being secured to the outer end of the shaft 14 for the purpose of imparting to the same a reciprocating angular displacement.

The apparatus works as follows: The several parts being in the position shown on the left side of Fig. 7—say the cores and the sleeve x being raised up to the upper edge of the molds and the caps (not shown) being placed upon the cores—melted wax is poured in the tray r . The sleeves x then are lowered by operating the hand-lever 13 and brought in the position shown in the right-hand side of Fig. 7. The wax fills the annular space between the molds and the cores, so that the cylinders are cast in the same manner as in the foregoing device. When the wax is cooled down, the cores are lowered by means of the gear 2 3 4 5, and finally the sleeves x are raised again, and the cylinders, which are now finished, project from the tray r and can be easily removed from the machine.

Having now particularly described and ascertained the nature of my invention and in what manner it is to be performed, I declare that what I claim is—

1. The combination with a mold and a core within the same peripherally grooved, and mechanism connected therewith for effecting positively the movement of one of said parts in the direction of its length with respect to the companion part.

2. The combination with a mold and a core within the same peripherally grooved, and mechanism connected therewith for causing positively the reciprocation of one of said parts with respect to the companion part.

3. An apparatus of the character described, consisting of a mold, a grooved core within the same, and mechanism connected therewith for effecting positively the rotation of said core and simultaneously moving it in the direction of its length.

4. In an apparatus of the character described, a mold, a grooved core within and concentric to the mold, a cutting member carried by said core for the purpose of cutting clean the edge of the finished cylinder.

5. In an apparatus of the character described, the combination of a cylindrical mold, a helical grooved core within the mold, a cutting member carried by the core for cutting clean the upper edge of the finished cylinder,

and means for rotating and reciprocating the core.

6. An apparatus for casting cylinders for phonographs and the like, consisting of a mold, a grooved core within and concentric to the mold, a tray supported by the mold, mechanism for imparting a rotary and reciprocating movement to the core, means for actuating said mechanism, and means for cutting clean the upper edge of the cylinder when cast.

7. An apparatus of the character described, consisting of a series of cylindrical molds, helical grooved cores within and concentric to the molds, and means for advancing said cores consisting of vertical threaded rods and relatively fixed nuts on each of said rods in combination with a gear mechanism and a hand-operated crank.

8. An apparatus of the character described, consisting of a series of cylindrical molds, helical grooved cores within and concentric to the molds, and means for advancing said cores consisting of vertical threaded rods and relatively fixed nuts on each of said rods in combination with a gear mechanism and a hand-operated crank.

9. In an apparatus of the character described, the combination of molds, helical grooved cores within the molds, a tray carried by said molds for the reception of the molten wax, means for imparting to the cores a rotary and reciprocating movement, and means for cutting clean the upper edge of the cylinder when cast.

10. In an apparatus for casting cylinders for phonographs and the like, the combination of cylindrical molds, helical grooved cores within and concentric to the molds, sockets forming the bottom of the molds between the molds and the cores, a tray for receiving the molten wax supported by the molds, means for imparting to the cores a rotary and reciprocating movement, and means for cutting clean the upper edge of the cylinder when cast.

11. An apparatus of the character described, consisting of a series of cylindrical molds, helical grooved cores within and concentric to the molds, vertical reciprocating sleeves between the molds and the cores, and means for imparting either to the cores or the sleeves vertical reciprocating movement.

12. An apparatus of the character described, consisting of stationary cylindrical molds in connection with a tray for the wax, helical grooved cores within the said molds, means for moving said cores up and down, a series of sleeves in the annular space between the molds and the cores, and means for reciprocating said sleeves.

13. An apparatus of the character described, consisting of stationary cylindrical molds in connection with a tray for the wax, helical grooved cores within the said molds, means for moving said cores up and down, a series of sleeves in the annular space between the molds and the cores, and means for reciprocating said sleeves.

14. In an apparatus of the character described, a mold, a grooved core within the mold, a vertically-reciprocating sleeve between the mold and the core, and means for independently operating the core and the sleeve.

15. An apparatus of the character described, consisting of a series of cylindrical molds, helical grooved cores within the molds, a cutting member carried by each of the cores for cutting clean the upper edge of the finished cylinder, means for reciprocating said cores, a series of sleeves in the annular space between the molds and the cores, and means for independently operating each of said sleeves in opposite directions from one another.

16. An apparatus of the character described, consisting of a series of stationary cylindrical molds in connection with a tray for the wax, helical grooved cores within and concentrically to said molds, means for reciprocating said cores, a series of sleeves in the annular spaces between the molds and cores, having cutting members carried by each of said cores for cutting clean the upper edge of the finished cylinder and means for reciprocating each of said sleeves for ejecting the finished cylinder.

17. An apparatus of the character described consisting of a mold, a grooved core within the mold, a cutting member carried by the said core, means for reciprocating the said core and means for ejecting the finished cylinder from the mold.

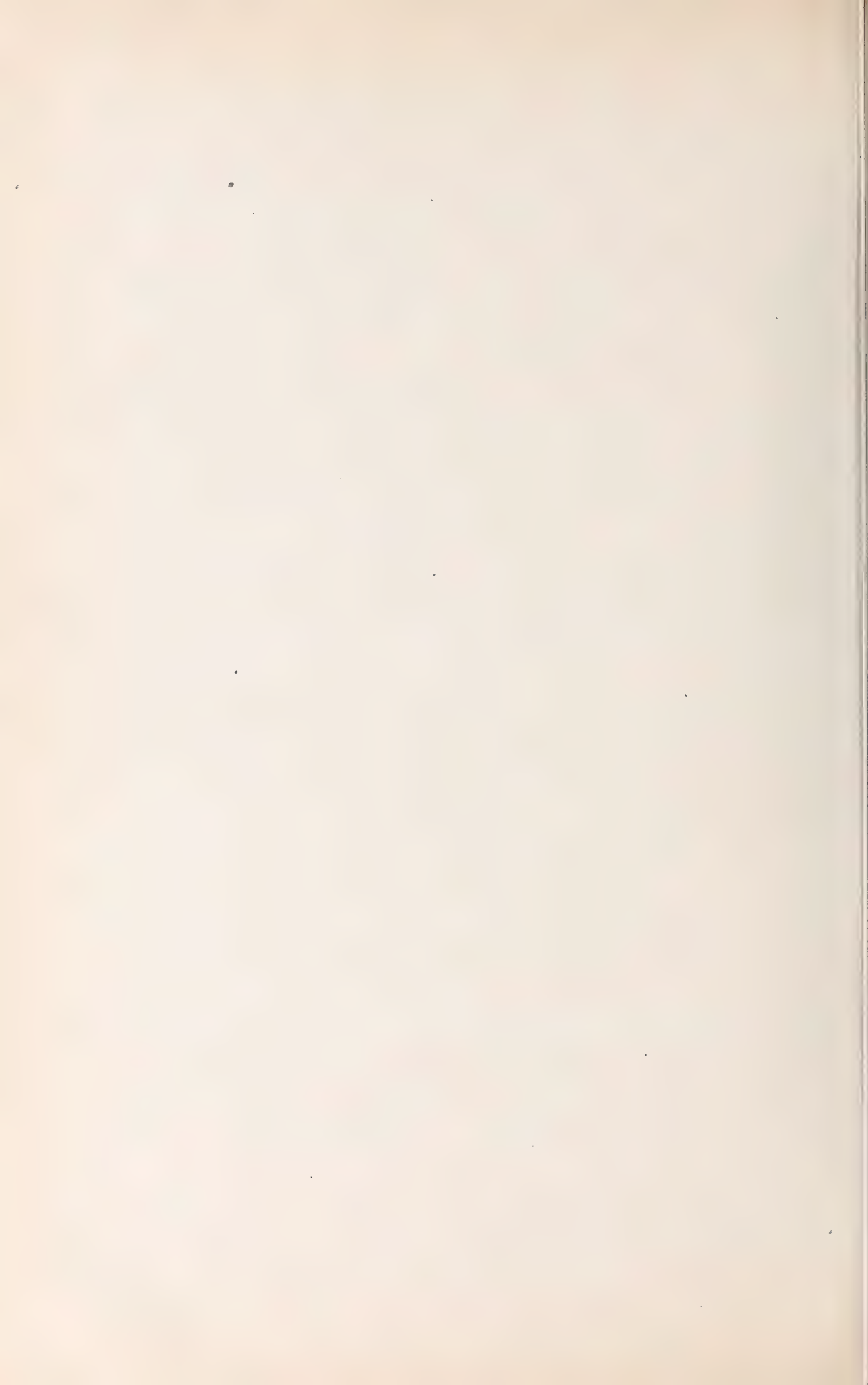
18. An apparatus of the character described, consisting of a series of molds, helical grooved cores within and concentric to the molds, a cutting member carried by each of said cores, means for rotating and reciprocating the said cores, a series of movable sleeves in the annular spaces between the molds and the cores, and means for moving said sleeves for ejecting the cylinder when cast.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

AUGUSTIN HAMON.

Witnesses:

AUGUSTUS E. INGRAM,
ALFRED FREY.



758,466

No. 758,466.

PATENTED APR. 26, 1904.

E. T. PALMER.
TALKING MACHINE.

APPLICATION FILED MAR. 30, 1903.

NO MODEL.

Fig. 1.

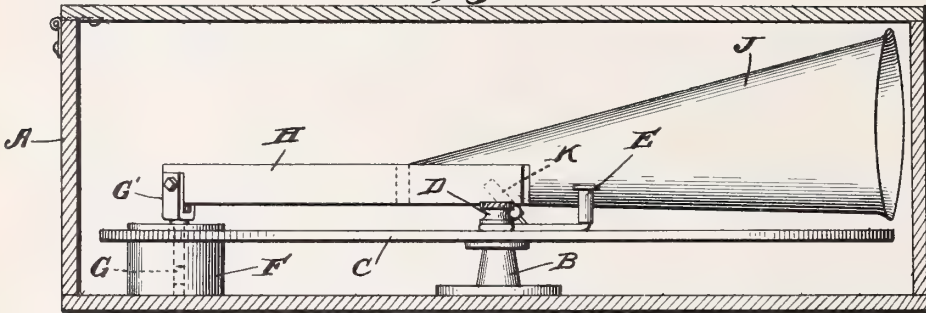


Fig. 2.

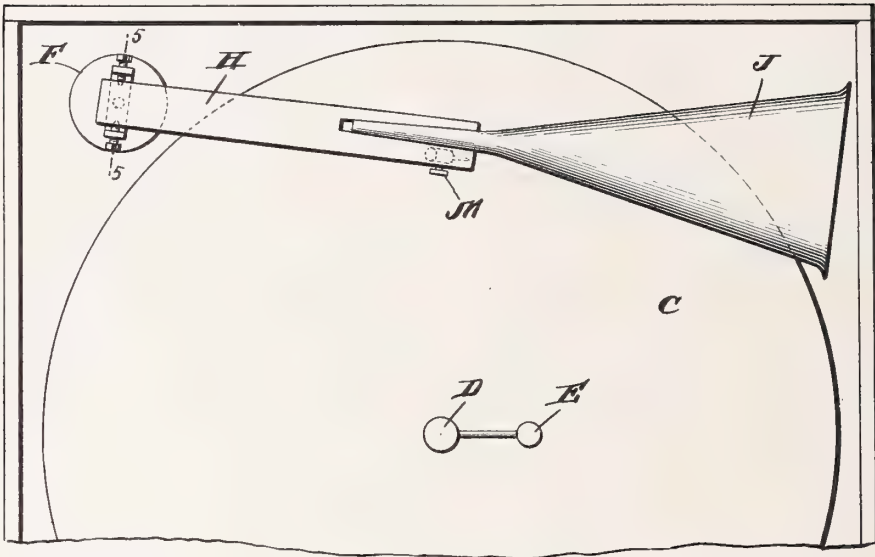


Fig. 3.

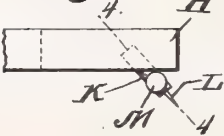


Fig. 4.

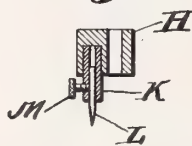
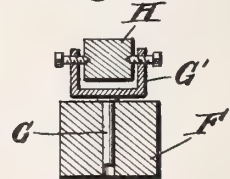


Fig. 5.



Witnesses:

Louis D. Heinrichs
L. H. Morrison

Inventor
Edward T. Palmer

By his Atty

W. B. Williams

UNITED STATES PATENT OFFICE.

EDWARD T. PALMER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
GEORGE C. HOLDEN, OF PHILADELPHIA, PENNSYLVANIA.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 758,466, dated April 26, 1904.

Application filed March 30, 1903. Serial No. 150,128. (No model.)

To all whom it may concern:

Be it known that I, EDWARD T. PALMER, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a certain new and useful Improvement in Talking-Machines, of which the following is a specification.

My invention relates to a new and useful improvement in phonographic machines, and has for its object to provide a machine for reproducing the sounds from a record, the machine to be so constructed as to be sold at a comparatively low price and yet be very effective in reproducing the sounds from the record.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a side elevation of the machine; Fig. 2, a plan view of the same; Fig. 3, a side elevation of the arm and needle which rests upon the record; Fig. 4, a section on the line 4 4 of Fig. 3; Fig. 5, a section on the line 5 5 of Fig. 2.

In all phonographic machines for reproducing sound from a disk record the machines are expensive, and therefore cannot be purchased by persons of limited means. Therefore I have provided a machine which can be made and sold at a comparatively low price and is intended as a toy, but will reproduce the sounds nearly if not quite as well as the more expensive machines.

A represents the case in which the machine may be held.

B represents a base provided with a spindle upon which the disk C is held.

D is a thumb-screw for securing the disk upon the spindle.

E is a crank also secured to the disk by the

thumb-screw, whereby the disk record may be turned by hand or otherwise.

F is a block secured to the bottom of the case A, and this block is provided with a vertical hole in which the pin G is adapted to fit. The upper end of the pin G is formed as indicated at G', and between the prongs of the form the arms H are pivoted by means of pointed screws I or otherwise which pass through the prongs and into cavities upon each side of the arm. Thus the arm H is pivoted both horizontally and vertically.

J represents the horn, which is preferably made of paper, but may be made of celluloid or any other suitable material, and the smaller end of this horn is secured in any suitable manner to the outer end of the arm H. In the drawings the arm H is shown bifurcated at the end and the smaller end of the horn thrust between the two prongs. The arm H is preferably made of wood, but can be made of any other suitable material, such as metal, hard rubber, &c.

K is the needle-socket, which is set part way into the outer end of one of the prongs of the arm H and is set at an angle, as shown in Fig. 1.

L represents the needle, which is secured in the socket by a set-screw M.

The lines which are cut in the disk record, as is well known, are cut spirally, and the needle lying within these lines will be gradually moved toward the center as the disk record is revolved. Thus in my machine it is only necessary to secure any of the standard disk records to the spindle of the base B. Then by inserting the pin G into the hole in the block F and allowing the needle to rest near the periphery of the record and by turning the record in the direction of the arrow in Fig. 2 the needle will follow the lines and swing upon the pin G toward the center of the record until the record has been entirely played, and the vibrations will be transmitted through the needle to the arm and horn, so as to reproduce the sound.

Of course I am aware that the same general principle of all disk-record machines is

utilized by me in this machine; but I do not wish to claim the principle broadly, but only wish to claim my particular construction, which enables me to do away with the sound-

5 box and manufacture the machine at a comparatively small cost, and I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.

10 Having thus fully described my invention, what I claim as new and useful is—

1. In a phonographic machine, the combination of a disk record mounted so as to rotate upon a vertical spindle, a crank for turning the same, a block located stationary beyond the periphery of the disk, a pin fitting loosely within a vertical hole in the block, the upper end of the pin being bifurcated, an arm, one end of which is pivoted between the prongs 20 of the bifurcated end of the pin so that said arm will swing vertically, the outer end of the arm being bifurcated, a horn, the smaller end of which is held between the prongs of the bifurcated end of the arm, a removable 25 needle secured at the outer end of one of the prongs of the arm at an angle and adapted to rest upon the record, as specified.

2. In a phonographic machine, a case, a base secured to the bottom of the case, a spindle 30 extending up vertically from the base, a disk record secured so as to revolve upon said spindle, a thumb-screw threaded upon the up-

per end of the spindle for securing the record in place, a crank connected to the center of the record for turning the same, a block 35 secured to the bottom of the case outside the periphery of the record, a pin fitting vertically within the block so as to turn within the same, the upper end of the pin being bifurcated, a wooden arm, one end of which extends between the prongs of the bifurcated 40 end of the pin, pointed screws threaded through the prongs, and into each side of the arm so as to pivot the same, the outer end of the arm being bifurcated, a paper horn, the smaller 45 end of which is thrust and held between the prongs of the arm, a needle-socket secured at an angle in the outer end of one of the prongs of the arm, a needle fitting in the socket and resting upon the record, and a set-screw for 50 securing the needle in the socket, as specified.

3. A sound-reproducing machine comprising a swinging fork adapted to receive and transmit sound-vibrations, and a horn carried by said fork and adapted to receive and transmit 55 sound-vibrations transmitted to said fork, as specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

EDWARD T. PALMER.

Witnesses:

MARY E. HAMER,
L. W. MORRISON.

758,521

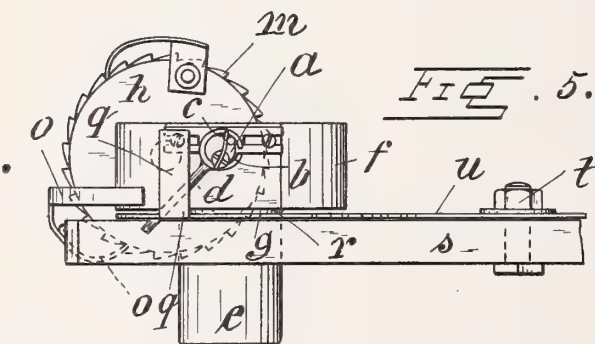
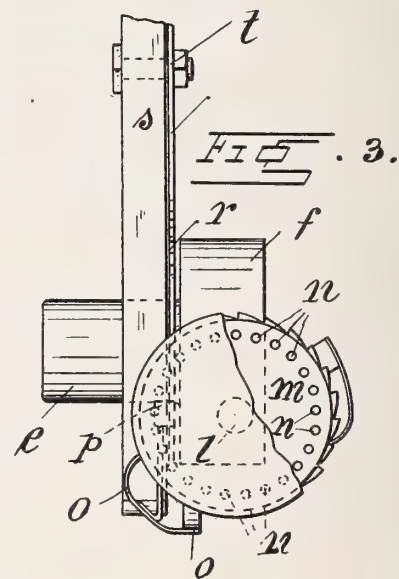
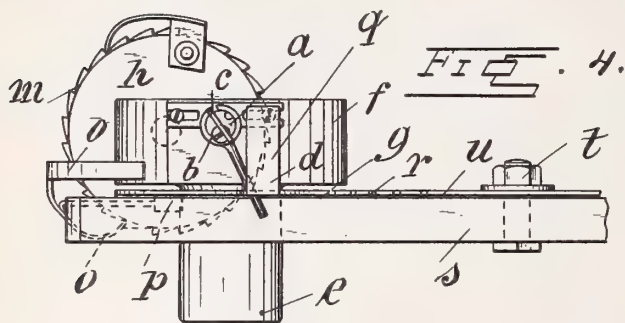
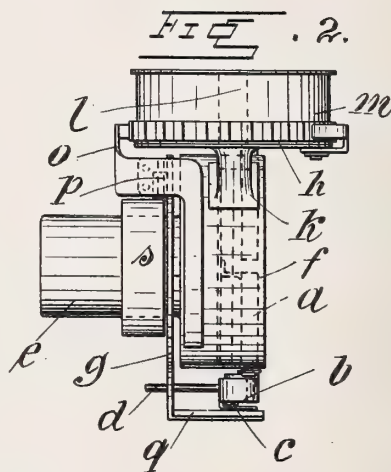
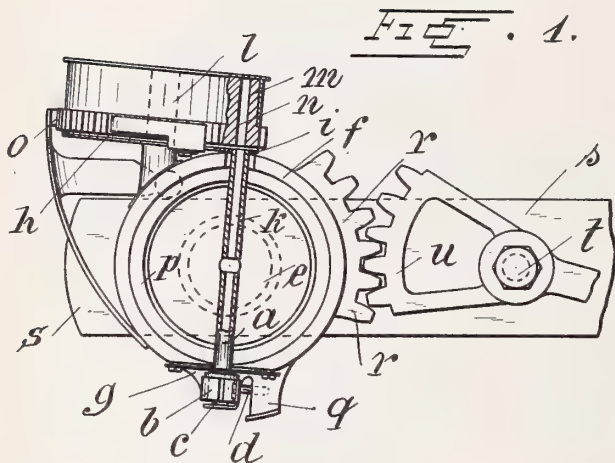
No. 758,521.

PATENTED APR. 26, 1904.

P. GÄBLER.
PHONOGRAPH.

APPLICATION FILED MAR. 30, 1903.

NO MODEL.



Witnesses:-

K. Müller
Karl Müller

Inventor:-

Paul Gäbler
by Gustav W. Hoppenitz
att'y.

UNITED STATES PATENT OFFICE.

PAUL GÄBLER, OF LEIPZIG-GOHLIS, GERMANY.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 758,521, dated April 26, 1904.

Application filed March 30, 1903. Serial No. 150,286. (No model.)

To all whom it may concern:

Be it known that I, PAUL GÄBLER, a subject of the King of Saxony, and a resident of Leipzig-Gohlis, in the Kingdom of Saxony, Germany, have invented certain new and useful Improvements in Phonographs and the Like, of which the following is a full, clear, and exact description.

The present invention consists of a device for automatically changing the membrane-pin of a gramophone, phonograph, or the like, and comprises the details of construction hereinafter set forth, and particularly pointed out in the claims.

In order to render the present specification easily intelligible, reference is had to the accompanying drawings, in which similar letters of reference denote similar parts throughout the several views.

Figure 1 is a front elevation of the device; Fig. 2, an end elevation; Fig. 3, a plan of the same. Fig. 4 is a view of the device seen from underneath, showing the pin-holder in the open position; and Fig. 5 is a similar view showing the same closed and the pin clamped in position.

The pin-holder *a*, which is connected to the membrane, is in the form of a tube down which a pin may slide and in the lower end of which the said pin is clamped by means of a ring *b*, mounted to rotate on the end of the said holder, and having an arm *d* fast thereon, by means of which the said ring is turned. The said ring *b* further carries a spring *c*, extending across the lower side or bottom of the tube *a* and adapted when the said ring is turned on the tube to come underneath the lower tube-orifice and prevent the pin which has just been allowed to slide down the tube from falling out before it has been properly clamped in the holder by means of the ring *b*.

To the neck *e* of the sounding-box *f* a disk *g* is attached, which is adapted to be turned on the said neck, and the said ring *g* carries a cam-nose *p*, hereinafter described, and an arm *q*, having a horizontally-extending foot formed on its outer end. When the ring *g* is revolved, the arm *q* strikes the arm *d* of the clamping-ring *b* and turns the same from the position shown in Fig. 5 to that in

Fig. 4, and vice versa when turned back, the said arm *q* being slotted and the arm *d* lying in the slot.

Fixed to the upper part of the sound-bell *f* is a plate *h*, extending substantially horizontally and having a downwardly-extending tubular prolongation, as at *k*, which forms a prolongation of the tubular holder *a*, but does not contact directly with the top of the same, but leaves it sufficient play for its necessary vibration with the membrane. To the center of the plate *h* a pivot-pin *l* is fixed, extending upwardly, and on this pin a drum *m* is mounted to rotate. This drum *m* has a series of perforations in its bottom close to the periphery of the same, which orifices serve to contain each a reserve membrane-pin. The bottoms of the holes *n* are closed by the plate *h*, with the exception of the orifice which lies above the tubular extension *k*, and the exterior part of the drum is provided with a series of ratchet-teeth, which may be operated by a spring-pawl on the movement of the ring *g*. When the ring *g* is moved, the cam-nose *p* pushes the spring-pawl *o* back, and when the ring *g* is again turned back the spring-pawl turns the drum just far enough to bring the next pin over the extension *k* ready for the next change.

The ring *g* may be oscillated backward and forward by any suitable means. Thus, for instance, as shown, the ring may be provided with teeth around a part of its circumference, and a segment *u* may engage these teeth, said segment being mounted on the sounding-box supporting part *s* on a pivot *t* and may be turned back and forward to renew the pin by means of a handle.

The device is manipulated in the following manner: When the pin is worn or damaged, the handle of the segment is turned to move the ring *g* from the position shown in Fig. 4 to that shown in Fig. 5, and the cam-nose *p* simultaneously pushes back the pawl *o*. This first movement of the ring *g* turns the ring *b* to release the pin which had hitherto been clamped in the holder *a* and allows the same to fall out. On turning the ring *g* back the spring-pawl *o* shifts the drum *m* and brings a new pin over the feed-tube *k*. This pin falls

down the same; but before it can fall out at the bottom of the holder *a* the plate *q* has passed underneath the same, and as this plate passes back the spring *c* holds the pin fast until the total return movement of the ring *g* has securely fastened the substitute pin in the holder.

The ring *g* might be moved by any suitable parts of the device automatically instead of by hand; but the manner of operating the device is immaterial.

I claim as my invention—

1. A device in connection with gramophones, phonographs or the like, for automatically releasing and clamping a membrane-pin in the holder, comprising the combination of a pin-chute above the pin-holder, a rotary drum above the chute to bring a pin over the same when rotated a part of a revolution, an oscillatory ring mounted on the neck of the sounding-box and means in connection with the same for releasing the pin in the holder on one movement of its oscillation, and for rotating the said pin-drum one step on the backward oscillation, and for preventing the fresh pin supplied from falling out at the end of the holder until it is properly clamped by the said return movement substantially as described.

2. In a device of the class specified, the combination of a pin-chute mounted above the pin-holder, a clamping-ring having radially-extending arm on the pin-holder to clamp the pin, a rotary pin-carrying drum mounted above the chute, and an oscillatory ring mounted on the neck of the sounding-box, said ring having an arm to operate the clamp-

ing-ring in both directions when oscillated, and a pawl device operated by said ring to bring a fresh pin over the chute and means in connection with said ring for preventing the fresh pin from falling out at the end of the holder before it is properly clamped in the manner and for the purpose substantially as described.

3. In a device of the class specified, the combination of a pin-chute *n* mounted above the pin-holder, a clamping-ring *b* having radially-extending arm *d* to clamp the pin in the holder, a pin-drum mounted above the chute and having the pins arranged therein in proximity to its periphery, a ratchet-wheel fast on said drum, a ring *g* mounted on the neck of the sounding-board, an arm *q* on the same to engage and operate the arm *d* of the clamping-ring backward and forward at each oscillation of the said ring, a spring-pawl adapted to engage the teeth of the drum ratchet-wheel and a cam or lug on the said ring *g* to operate said spring-pawl on the movement of the ring, a horizontally-extending foot to said arm *q* to extend under the mouth of the holder when the ring is being oscillated and a spring *c* mounted on the said clamping-ring and extending below the mouth of the holder in the manner and for the purpose substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

PAUL GÄBLER.

Witnesses:

MORITZ SPREER,
R. H. DUNN.

758,546

No. 758,546.

PATENTED APR. 26, 1904.

J. A. MANAHAN & S. WALDECK.
MEANS FOR SLIDING AND HOLDING PHONOGRAPHIC
RECORDS ON MANDRELS.

APPLICATION FILED FEB. 6, 1904.

NO MODEL.

Fig. 1.

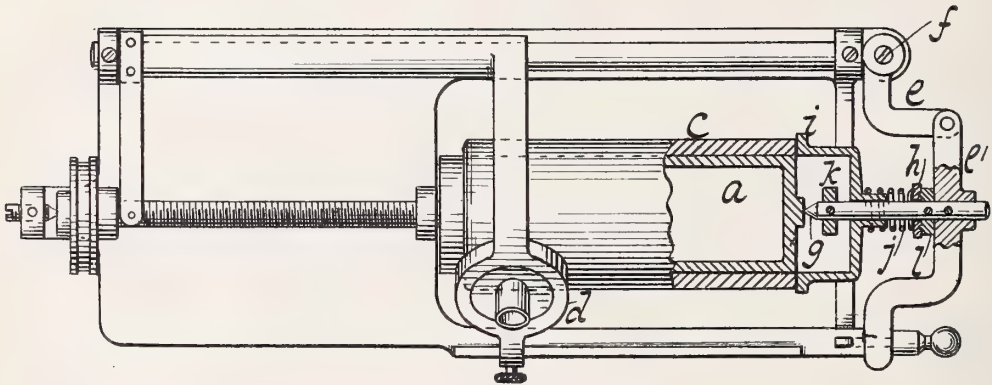
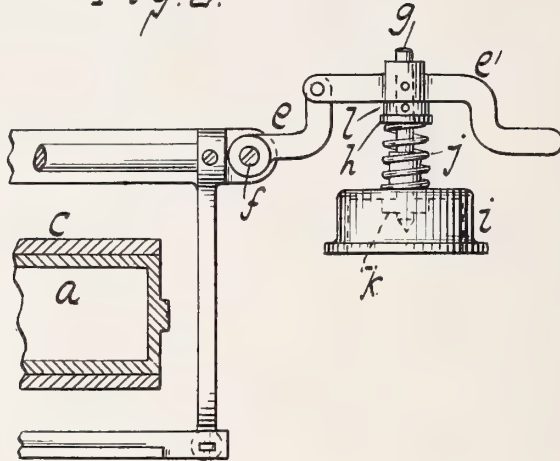


Fig. 2.



WITNESSES:

William Miller
George Kulsberg

INVENTORS

Joseph A. Manahan
Siegfried Waldeck

BY

W. C. Hauff
ATTORNEY

UNITED STATES PATENT OFFICE.

JOSEPH A. MANAHAN AND SIEGFRIED WALDECK, OF NEW YORK, N. Y.;
SAID MANAHAN ASSIGNOR TO SAID WALDECK.

MEANS FOR SLIDING AND HOLDING PHONOGRAPHIC RECORDS ON MANDRELS.

SPECIFICATION forming part of Letters Patent No. 758,546, dated April 26, 1904.

Application filed February 6, 1904. Serial No. 192,415. (No model.)

To all whom it may concern:

Be it known that we, JOSEPH A. MANAHAN and SIEGFRIED WALDECK, citizens of the United States, residing at New York city, in the county and State of New York, have invented new and useful Improvements in Means for Sliding and Holding Phonographic Records on Mandrels, of which the following is a specification.

By means of this invention a record which is slid onto the cylinder of a phonograph can be guided to correct position without danger of fracture or injury to the record.

This invention is set forth in the following specification and claims and illustrated in the annexed drawings, in which—

Figure 1 is a plan view of a phonograph or the like embodying this invention. Fig. 2 shows the holding means open or released.

In the drawings the letter *a* designates a cylinder which is adapted to be rotated by a train of gears driven by a spring-motor or other means. This cylinder is adapted to receive a record *c*, which is slid onto the same and rotates therewith. The reproducer or recorder *d* is given reciprocating motion along the record-cylinder to produce or record the sound-waves. The foregoing parts of the phonograph are well known. The device for guiding or sliding the record after the same has been placed on the cylinder comprises an arm *e*, which is pivoted at *f* to the case or base of the machine. The arm is formed with a pivoted or jointed section *e'*. A center is shown at *g*. On this center is loosely or rotatably mounted a buffer-cap *i*, pressed by spring *j* toward the record or toward a collar *h*, which latter prevents the cap sliding or dropping off the center when the cap is clear or away from the record.

The spring *j* can rotate with the cap about or on the center. This spring sits at one end

against the cap and engages at the opposite portion a rotary collar *h*, sitting against a collar *l*. This collar *l* can be fixed or screwed to the center *g*.

The arm carrying the buffer-cap can be actuated to swing out of the path of the cylinder, so that the record is free to be slid from the same. When the record is slid onto the cylinder, the pivoted arm carrying the buffer-cap is actuated to bring the latter over the cylinder-head and in contact with the rim of the record to gently push the same into a correct line or position. It will be noticed that the buffer-cap also prevents the record from sliding off the cylinder when the machine is operated.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. Means for holding or sliding phonographic records in place and comprising a center for a cylinder, and a rotary yielding or spring-pressed cap for the record.

2. Means for holding or sliding phonographic records in place and comprising a center, a rotary yielding cap and a washer for preventing the cap coming off the center.

3. A center, a rotary cap, a spring for the cap, a rotary washer to which the spring is engaged and a second washer against which the rotary washer sits or rotates.

4. A center, a rotary yielding or spring-pressed cap on the center, and a locking or holding arm for the center, said arm being composed of jointed sections.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

JOSEPH A. MANAHAN.
SIEGFRIED WALDECK.

Witnesses:

CHAS. E. POENSGEN,
MAX JUST.



Re 1243

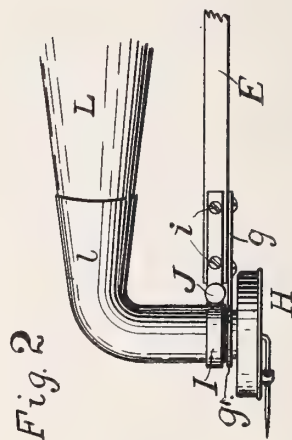
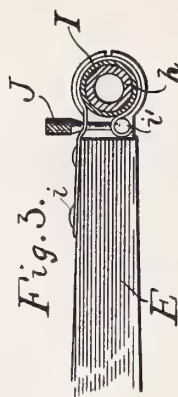
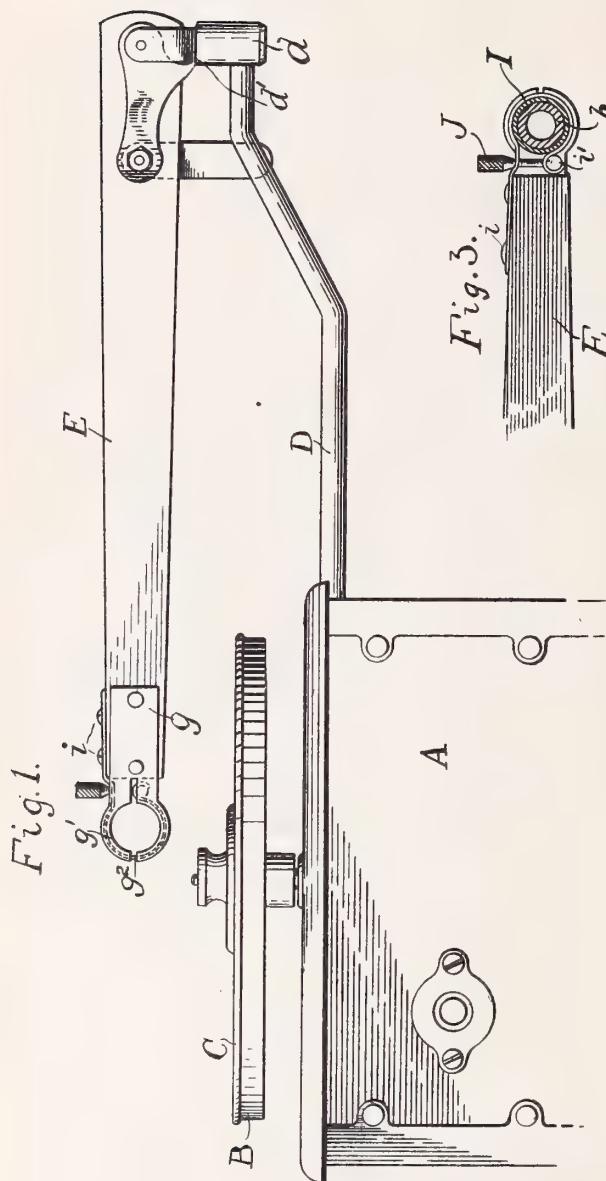
Re 12,213

No. 12,213

REISSUED APR. 26, 1904.

E. R. JOHNSON.
REPRODUCER SUPPORT FOR GRAMOPHONES.

APPLICATION FILED DEC. 26, 1903.



WITNESSES:
Philip Bellows.
Edw. W. Vaill Jr.

INVENTOR
Eldridge R. Johnson.
BY
John F. [Signature]
ATTORNEY.

UNITED STATES PATENT OFFICE.

ELDRIDGE R. JOHNSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR
TO THE VICTOR TALKING MACHINE COMPANY, A CORPORATION OF
NEW JERSEY.

REPRODUCER-SUPPORT FOR GRAMOPHONES.

SPECIFICATION forming part of Reissued Letters Patent No. 12,213, dated April 26, 1904.

Original No. 742,666, dated October 27, 1903. Application for reissue filed December 26, 1903. Serial No. 186,758.

To all whom it may concern:

Be it known that I, ELDRIDGE R. JOHNSON, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Reproducer-Supports for Gramophones, of which the following is a full, clear, and exact disclosure.

This invention relates to certain improvements in gramophones or talking-machines, and more particularly to mechanism for supporting the reproducer and its horn.

The object of said invention is to provide means for holding the sound-box or reproducer and amplifying-horn on a supporting-arm and for clamping the horn to the sound-box.

Briefly, my invention comprises the providing of separate holding means, one of which is adapted more especially to give a firm support to the sound-box, while the other, in addition to supporting the sound-box and amplifying-horn, keeps the said horn securely in connection therewith, but allows either to be removed independently of the other.

For a full, clear, and exact description of one form of my invention reference may be had to the following specification and to the accompanying drawings, forming a part thereof, in which

Figure 1 is a side elevation of a gramophone or talking-machine having my improvement applied thereto; Fig. 2, a plan view illustrating the reproducing mechanism or sound-box in position on the supporting-arm, and Fig. 3 a detail view showing the reproducer-arm in elevation and the tubular section of the sound-box and horn in section.

Referring to the drawings, A indicates the casing containing the motor mechanism, above which is the revolving turn-table B, which supports the record C.

Extending from one side of the casing A is a bracket-arm D, carrying on its outer end a sleeve *d*, in which is pivotally mounted a bi-

furcated arm D, which has the reproducer-arm E pivoted thereto.

On the inner end of the reproducer-arm E, I secure a flat plate *g*, having a ring *G'*, which may be split, as indicated at *g*². Said ring is preferably formed integral with said plate *g* and extends out beyond the end of the arm E, the inner diameter of said ring *G'* being sufficient to cause said ring to snugly fit the tubular section *h* on the reproducer or sound-box H, so that when the section *a* is placed in the ring *g* the said ring will firmly hold the reproducer in position. On the top of the arm E, I secure a spring-clamp I, which is secured to the said arm E by means of the screws *i*. The free end of the spring clamp or band I is bent in circular form and carries adjacent its end a solid piece of metal I in the nature of a nut, in which is a screw-threaded aperture adapted to receive the lower end of an adjusting-screw J. The upper portion of the screw J passes through an aperture in the upper portion of the clamp I, as clearly illustrated in Fig. 3 of the drawings. Thus when the sound-box is placed in the ring *g'* the tubular section *h* of said sound-box extends through the circular portion of the spring-clamp I, and when the end of the horn *l* is placed over the tubular section H it also passes within the circular portion of the spring-clamp I. By regulating the adjusting-screw J the band I is contracted to bind the horn and the sound-box together, and thus form a tight connection and a firm support for those parts. The elbow *l* on the inner end of the horn is generally made of leather and is of a size sufficient to snugly embrace a tubular section of the sound-box; but from constant usage this leather tube stretches and does not engage with a sufficient degree of firmness to hold it in position, and consequently has to be tied or wrapped with wire in many instances, which is inconvenient and unsightly. My spring-clamp above described obviates any such difficulties and firmly holds the end of the horn

to the sound-box. It also helps to support the sound-box in its operative position. By unscrewing the screw J a spring-band I is allowed to expand, and the horn and sound-box may be immediately separated and either or both removed. It will also be noticed that the sound-box may be removed from the supporting-arm without detaching the elbow 7 therefrom by simply loosening the screw J and allowing the sound-box to be withdrawn. The elbow and horn may also be removed independently of the sound-box, for when the said elbow is not in position within the clamp I the sound-box is supported by the ring g'. These features of construction particularly adapt the parts of my device to be easily assembled and separated, which is of great advantage where it is desired to carry the machine from place to place.

Having thus described one form of my invention, what I claim, and desire to protect by Letters Patent of the United States, is—

1. In a talking-machine, a reproducer-arm provided with independent means for supporting the communicating ends of the sound-box and amplifying-horn, said means being independent of the sound-passage establishing communication between said sound-box and horn.

2. In a talking-machine, the combination with the reproducer-arm, of a support adapted to receive and hold the sound-box in position, and means for receiving the end of the amplifying-horn and for holding the same in position and in operative relation to the sound-box, said support and means being independent of the sound-passage establishing communication between said sound-box and horn.

3. In a talking-machine, a reproducer-arm provided with means independent of each other for supporting the communicating ends of a sound-box and amplifying-horn, one of said means operatively engaging both the sound-box and horn when assembled, said means being independent of the sound-passage establishing communication between said sound-box and horn.

4. In a talking-machine, the combination with the reproducer-arm, of means secured to the free end of said arm and adapted to hold the sound-box in position, and means for holding the small end of the amplifying-horn in position about a portion of said sound-box.

5. In a talking-machine, a reproducer-arm, a sound-box, a horn, said sound-box entering a portion of said horn, means for holding said sound-box in position, and means for holding said horn in position, and for holding said sound-box and horn in engagement with each other, said means being independent of the sound-passage establishing communication between said sound-box and horn.

6. In a talking-machine, the combination

with the reproducer-arm, of an annular support secured to the free end of said arm, and adapted to receive and hold the sound-box in position, and means also attached to the free end of said arm for holding the amplifying-horn in position and for clamping the same to the sound-box.

7. In a talking-machine, a reproducer-arm, a sound-box, a horn having a compressible portion carried thereby, a sound-box engaging said portion, means for holding said sound-box in position, and means for compressing the compressible portion of said horn into contact with said sound-box.

8. In a talking-machine, the combination with the reproducer-arm, of a plate secured thereon having an opening therein to receive the tubular portion of the sound-box and a clamp also carried by said arm adapted to hold the small end of the amplifying-horn in position and to clamp the same to the tubular portion of the sound-box.

9. In a talking-machine, the combination with the reproducer-arm, of a plate secured to the free end thereof and comprising a ring adapted to receive and hold the tubular portion of a sound-box in position, and an adjustable clamp also carried by said arm for holding the small end of the amplifying-horn in position and for clamping the same to the tubular portion of the sound-box.

10. In a talking-machine, the combination with the reproducer-arm, of a ring secured thereto for receiving the tubular portion of a sound-box, a band also secured to said arm and means for contracting said band.

11. In a talking-machine, the combination with the reproducer-arm and reproducer, of a ring secured thereto and adapted to receive the tubular portion of a sound-box, a band also attached to said arm and a thumb-screw for contracting said band.

12. In a talking-machine, the combination with the reproducer-arm and reproducer, of a plate secured to the free end of the arm having its end projecting beyond the same, the said end being provided with a circular opening to hold the tubular portion of the reproducer, a spring-band also secured to said arm, and means for contracting said spring-band.

13. In a talking-machine, the combination with the reproducer-arm and reproducer, of a plate secured to the free end of the arm having its end projecting beyond the same, the said end being provided with a circular opening to hold the tubular portion of the reproducer and being split to form clamping-sections, a spring-band also secured to said arm and means for clamping said spring-band.

14. In a talking-machine, the combination with the reproducer-arm and reproducer, of a horn and flexible connection with said horn and reproducer, a plate secured to the free end

of the arm, having its end projecting beyond the same, said end being provided with a circular opening to hold the tubular portion of the reproducer, a spring-band also secured to said arm and means for clamping said spring-band about said flexible connection and tubular portion of the reproducer.

10 15. In a talking-machine, the combination with the reproducer-arm and reproducer, of a horn, a flexible connection between said horn and reproducer, a plate secured to the free end of the arm having its end projecting beyond the same, the said end being provided with a

circular opening to hold the tubular portion of the reproducer and being split to form spring clamping-sections, a spring-band also secured to said arm, and means for clamping said spring-band about said flexible connection and tubular portion of the reproducer. 15

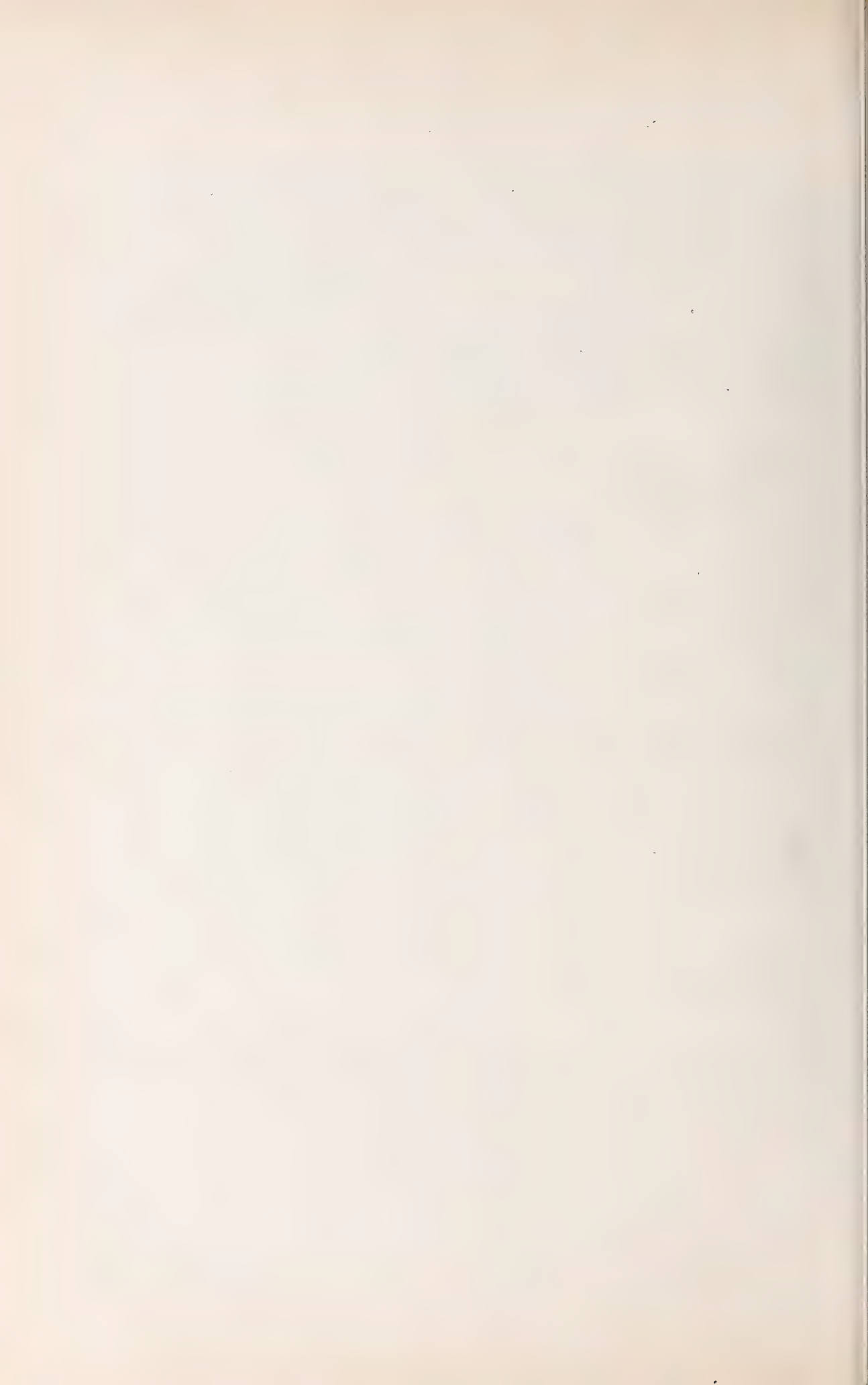
In witness whereof I have hereunto set my hand this 21st day of December, A. D. 1903. 20

ELDRIDGE R. JOHNSON.

Witnesses:

FREDK. C. EBERHARDT,

CHAS. K. BENNETT.



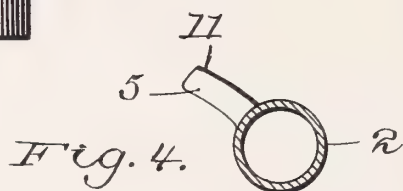
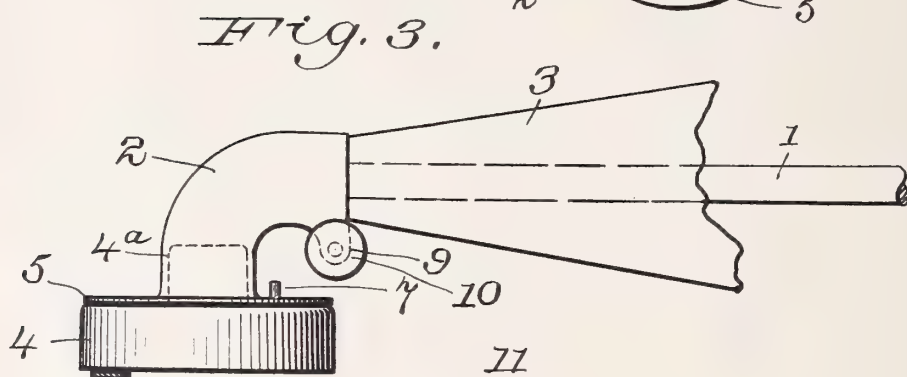
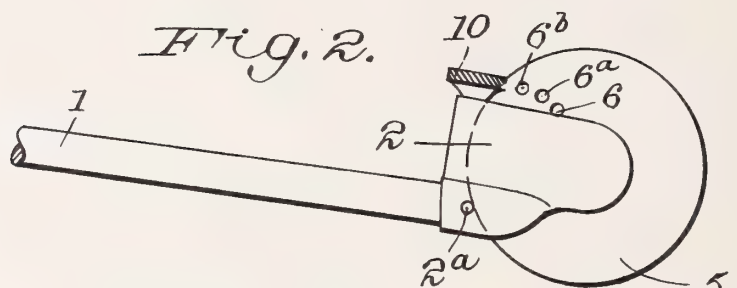
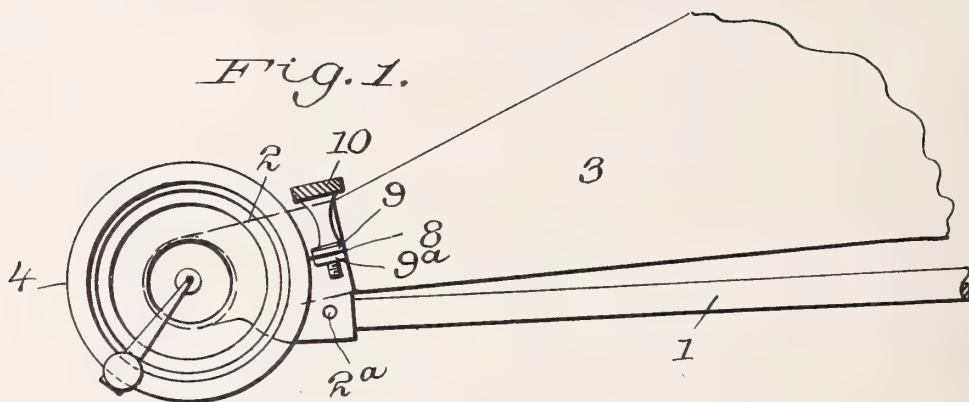
759,142

No. 759,142.

PATENTED MAY 3, 1904.

L. P. VALIQUET.
TALKING MACHINE.
APPLICATION FILED OCT. 1, 1903.

NO MODEL.



Witnesses
W. H. Humphrey
W. G. Crawford

Inventor
Louis P. Valiquet
By his Attorney A. Parlier Smith

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,142, dated May 3, 1904.

Application filed October 1, 1903. Serial No. 175,300. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of the borough of Bronx, city, county, and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates generally to talking-machines; and more specifically it consists of improved means for supporting the horn employed in talking-machines and for connecting it with the sound-box.

In the manufacture and handling of talking-machines in large quantities it becomes important to make the main body of the horn employed therewith separate from the elbow which connects it with the sound-box for convenience and economy of space in packing. At the same time a separate or separable elbow is apt to become lost in shipping and handling, and elaborate fastening means are often necessary to hold all these separable parts together when assembled. It has also become desirable to have a horn and horn-supporting mechanism which can be used indifferently with any one of the several makes of sound-box now on the market. I have invented a construction of apparatus which has a separable elbow without increasing the number of parts when the machine is taken down and which can also be used with the different standard sound-boxes.

The preferred form of apparatus is shown in the accompanying sheet of drawings, in which—

Figure 1 is a side elevation of my invention. Fig. 2 is a back view of the elbow and portion of the supporting-arm. Fig. 3 is a plan view of the same, showing the sound-box in position and a portion of the horn. Fig. 4 shows a modified form of sound-box-engaging flange.

Throughout the drawings like reference-figures indicate like parts.

1 represents one end of the ordinary swinging supporting-arm, to which the tubular elbow 2 is fastened by means of the socket and pin 2^a or by any other convenient means.

3 is the horn, made to slide into the end of

the elbow adjacent to the supporting-arm, and 4 is the ordinary form of sound-box, having a short tubular extension 4^a, adapted to enter the free end of the elbow 2.

5 is a flange on that end of the elbow 2 having one or more perforations 6 6^a 6^b, &c., and 7 is the usual pin on the back of the sound-box 4, engaging one of said perforations in the flange. The other end of the elbow is split, as shown at 8, and the opposing parts of the elbow so severed are provided with lugs 9 and 9^a, which are properly perforated to permit the thumb-screw 10 to engage them and draw them together.

In the modification shown in Fig. 4 the main portion of the flange 5 is cut down to a diameter just sufficient to allow it to serve as a guide to the tubular extension 4^a of the sound-box when the same is being inserted in the elbow and leaving the irregular-shaped projection 11 to engage with the pin 7 on the sound-box and serve as a stop therefor.

The method of operation of my invention is as follows: The small end of the horn 3 is inserted in the elbow 2 and clamped there by means of the thumb-screw 10, and the sound-box 4 is placed in position by inserting the tubular extension 4^a in the flanged end of the elbow and the pin 7 in that one of the holes 6 6^a, &c., with which it is adapted to engage, or the sound-box is turned until said pin 7 strikes the projection 11, if the modification shown in Fig. 4 be employed. In taking down the machine the above-described operations are reversed.

The advantages of the invention comprise the reduction of the number of parts, the elbow, supporting-arm, and fastening means being all made in one integral structure, the economy of space in packing the separated parts, it being possible to nest a large number of horns in a small space, and the facility with which various standard makes of sound-box may be employed with the same horn and supporting and connecting means.

It is evident of course that various changes could be made in the details of construction above described without departing from the spirit and scope of my invention. Other

methods of attaching the elbow to the supporting-arm might be employed and other fastening means for holding the horn in position. Some of the features described might
5 be dispensed with without destroying the utility of the remaining improvements. All such modifications I should consider still within the boundaries of my invention.

10 Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a talking-machine, the combination of a tubular elbow, a supporting-arm fastened thereto, and a flange on the free end of the
15 elbow for engagement with the sound-box.

2. In a talking-machine, the combination of a tubular elbow, a supporting-arm fastened thereto, and a flange on the free end of the elbow for engagement with the sound-box,
20 said flange being provided with an opening for the purpose described.

3. In a talking-machine, the combination of a tubular elbow, a supporting-arm fastened thereto, and a flange on the free end of the
25 elbow for engagement with the sound-box, said flange being provided with a series of openings for the purpose described.

4. In a talking-machine the combination of a tubular elbow provided at one end with a
30 flange having a perforation therein, and a sound-box having a tubular extension adapted to enter the elbow and a pin adapted to enter the perforation in the flange.

5. In a talking-machine, the combination of the supporting-arm, and a tubular elbow connected at one end to said arm, and provided at
35 the other end with a flange having a perforation therein for the purpose described.

6. In a talking-machine, the combination of the supporting-arm, and a tubular elbow connected at one end to said arm, and provided at
40 the other end with a flange having a perforation therein for the purpose described, the end of the elbow adjacent to the supporting-arm being provided with clamping means for at-
45 tachment to a horn.

7. In a talking-machine, the combination of the supporting-arm, and a tubular elbow connected at one end to said arm, and provided at
the other end with a flange having a perfora-
50 tion therein for the purpose described, the end of the elbow adjacent to the supporting-arm being split and provided with screw mechanism for forcing the split portions together.

8. In a talking-machine, the combination of
55 the supporting-arm, and a tubular elbow connected at one end to said arm and provided at the other end with a sound-box-engaging flange.

Signed at New York, N. Y., this 21st day of
60 September, 1903.

LOUIS P. VALIQUET.

Witnesses:

J. E. PEARSON,
M. G. CRAWFORD.

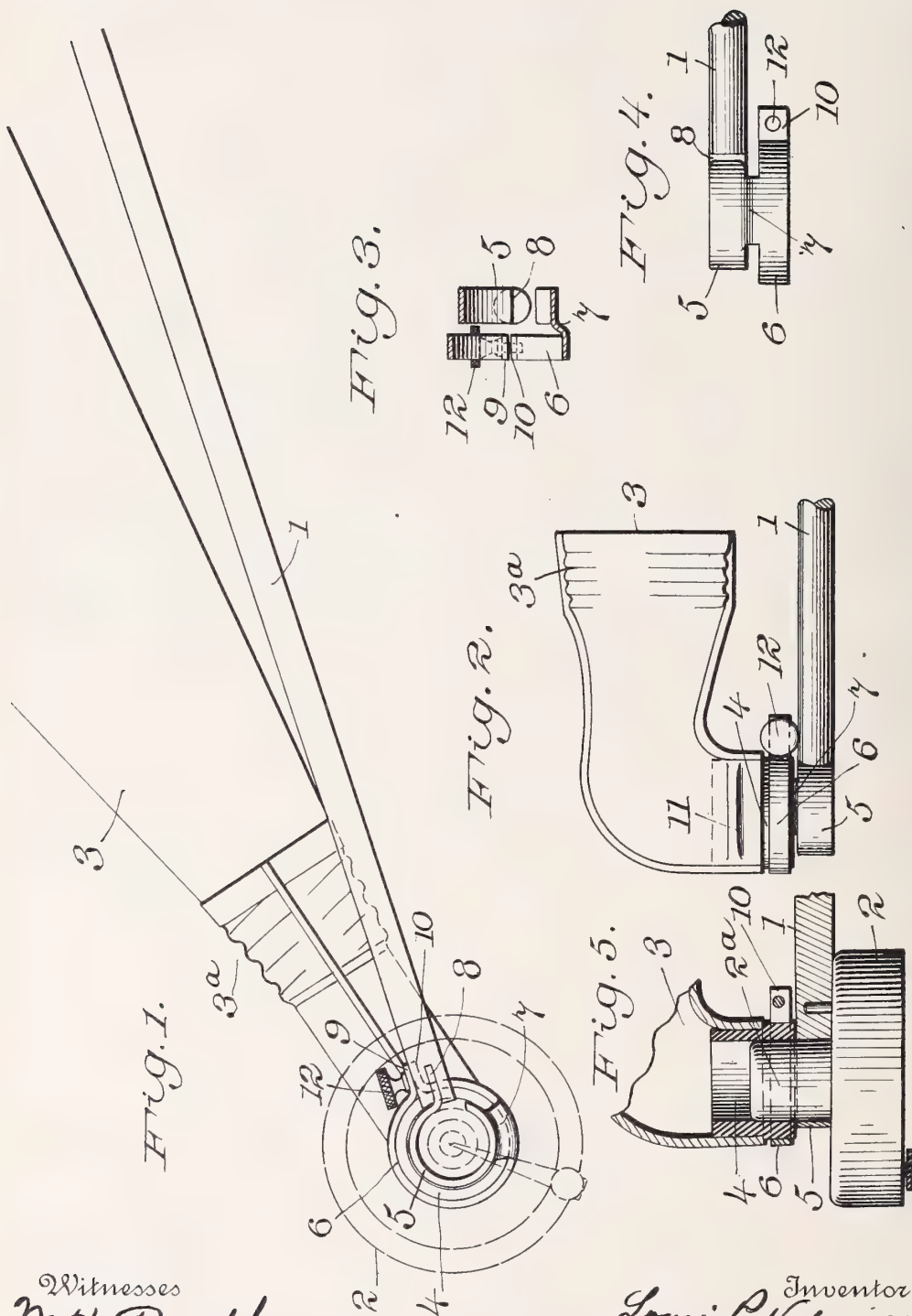
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No. 759,143.

PATENTED MAY 3, 1904.

L. P. VALIQUET.
TALKING MACHINE.
APPLICATION FILED OCT. 1, 1903.

NO MODEL.



Witnesses
W. H. Humphrey
M. G. Crawford

Inventor
Louis P. Valiquet
By his Attorney R. Parker Smith

UNITED STATES PATENT OFFICE.

LOUIS P. VALIQUET, OF NEW YORK, N. Y., ASSIGNOR TO VICTOR TALKING MACHINE COMPANY, A CORPORATION OF NEW JERSEY.

TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,143, dated May 3, 1904.

Application filed October 1, 1903. Serial No. 175,301. (No model.)

To all whom it may concern:

Be it known that I, LOUIS P. VALIQUET, a citizen of the United States of America, and a resident of the borough of Bronx, city, county, and State of New York, have invented certain new and useful Improvements in Talking-Machines, of which the following is a specification.

My invention relates in general to talking-machines; and more specifically it consists of an improved apparatus for assembling and connecting the sound-box, horn, and supporting-arm therefor.

The preferred construction embodying my invention is illustrated in the accompanying sheet of drawings, in which—

Figure 1 is a side elevation of the supporting-arm, horn, and connecting-rings, with the position of the sound-box indicated in broken lines. Fig. 2 is a plan view of the horn-elbow-supporting arm and connecting-rings. Fig. 3 is a detail in section of the double connecting-ring. Fig. 4 is a reversed plan view of the double connecting-ring and portion of the supporting-arm. Fig. 5 is a detail longitudinal section of the parts shown in Figs. 1 and 2, the sound-box being shown in full lines in position.

Throughout the drawings like reference-figures indicate like parts.

1 is the usual swinging arm for supporting the sound-box and horn, which I prefer to make of metal.

2 is the usual form of sound-box having a short tubular extension 2^a.

3 is the horn for amplifying the reproduced sound-waves. This horn may be made with a detachable elbow, as shown, connected to the main part of the horn by the screw-joint 3^a.

4 is the bushing, of flexible non-conducting material, inserted in the end of the horn and held in place in any convenient manner, as by expanding it into the bead 11. (Shown in Fig. 2.)

5 is a ring mounted in the end of the supporting-arm 1, adapted to receive and support the tubular extension 2^a of the sound-box. This ring is preferably formed by bending up a strip of metal without fastening the

ends together and is mounted in the arm 1 by inserting the radial extension 8 of one end of the ring into the said arm, as best shown in Fig. 1. A second ring 6, preferably of slightly larger diameter, is concentric with the ring 5, and the two are attached together along a portion of their adjacent circumferences, preferably by means of the connecting-web 7, as clearly shown in Figs. 3 and 4. This ring is also split at one side, its ends being bent outward in parallel extensions 9 and 10, which are normally slightly separated, but may be clamped together by means of the thumb-screw 12.

The end of the horn 3, which, as shown in the drawings, consists of the non-metallic bushing 4, fits over the end of the tubular extension 2^a of the sound-box and into the split clamping-ring 6.

The method of operation of the invention is as follows: The parts being assembled as shown in Figs. 1 and 5, tightening of the thumb-screw 12 clamps the ring 6 down upon the bushing 4 and this in turn upon the tubular extension 2^a of the sound-box, thereby holding all the parts firmly together in their proper position. On loosening the thumb-screw 12 the horn and sound-box, or either of them, may be removed and the double ring left supported upon the end of the swinging arm 1.

Among the advantages of my invention are the convenience of manipulation, as above described, the fastening of all the parts of the reproducer together by the action of one clamping means, the elimination of all rattling of the parts during reproduction, and cheapness of manufacture, the double ring being stamped up out of one sheet of metal, leaving the connecting-web 7 between the two parts, and then bending these into circular form. It is also evident that there are no loose parts to become misplaced or lost when the machine is taken down for packing or other purposes.

It is evident, of course, that various changes could be made in the details of construction above described without departing from the spirit and scope of my invention. The two

parts of the double ring might be connected together by other means, and other means of attaching the ring to the swinging arm might be substituted. The non-metallic bushing 4
5 might be dispensed with and also the separable elbow for the horn. These and similar modifications, however, I consider mere mechanical details and should regard the resulting structures as still within the boundaries
10 of my invention.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a talking-machine, a swinging arm provided with a ring at one end for supporting
15 the sound-box, and a clamping-ring for holding the horn attached to the first-mentioned ring along a portion only of their adjacent circumferences.

2. In a talking-machine, a swinging arm provided with a yielding ring at one end for supporting the sound-box, and a split clamping-
20 ring for holding the horn attached to the yielding ring along a portion only of their adjacent circumferences.

3. In a talking-machine, a swinging arm provided with a yielding ring at one end for supporting the sound-box, and a split clamping-
25 ring for holding the horn attached to the yielding ring along a portion only of their adjacent circumferences, said two rings being stamped up out of one piece of metal.

4. In a talking-machine, the combination of a sound-box having the usual short tubular
35 extension, a supporting-arm provided at the end with a metal ring fitting over said tubular extension, a horn having its end adapted to fit over said tubular extension, and a split clamping-ring adapted to receive the end of
40 the horn, and attached to the first-mentioned ring along a portion only of their adjacent circumferences.

5. In a talking-machine, the combination of a sound-box having the usual short tubular
45 extension, a supporting-arm provided at the end with a metal ring fitting over said tubular extension, a horn having its end adapted

to fit over said tubular extension, and a split clamping-ring adapted to receive the end of
50 the horn, and attached to the first-mentioned ring along a portion only of their adjacent circumferences, the ends of the tubular extension of the sound-box and of the horn being both within the grasp of the clamping-
55 ring when the parts are assembled.

6. In a talking-machine, the combination of a sound-box having the usual short tubular
extension, a supporting-arm provided at the end with a metal ring fitting over said tubular
60 extension, a horn having its end adapted to fit over said tubular extension, and a split clamping-ring adapted to receive the end of the horn, and attached to the first-mentioned ring along a portion only of their adjacent
65 circumferences, the end of the horn entering the clamping-ring being formed of flexible non-metallic material.

7. As an article of manufacture, a double ring for talking-machines formed out of one
sheet of metal with a short connecting-web
70 left between the two parts which are bent up into circular form, one of the rings having one radially-projecting end for attachment to a supporting-arm, and the other ring having
75 two parallel projecting ends, perforated for the insertion of clamping means.

8. As an article of manufacture, a double ring for talking-machines formed out of one
sheet of metal with a short connecting-web
80 left between the two parts which are bent up into circular form, one of the rings having one radially-projecting end for attachment to a supporting-arm, and the other ring having
85 two parallel projecting ends, perforated for the insertion of clamping means, the last-mentioned ring being of slightly larger diameter than the other ring.

Signed at New York, N. Y., this 21st day of September, 1903.

LOUIS P. VALIQUET.

Witnesses:

J. E. PEARSON,

M. G. CRAWFORD.

No. 759,348.

PATENTED MAY 10, 1904.

A. CLARK.
GRAMOPHONE OR TALKING MACHINE.

APPLICATION FILED APR. 26, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

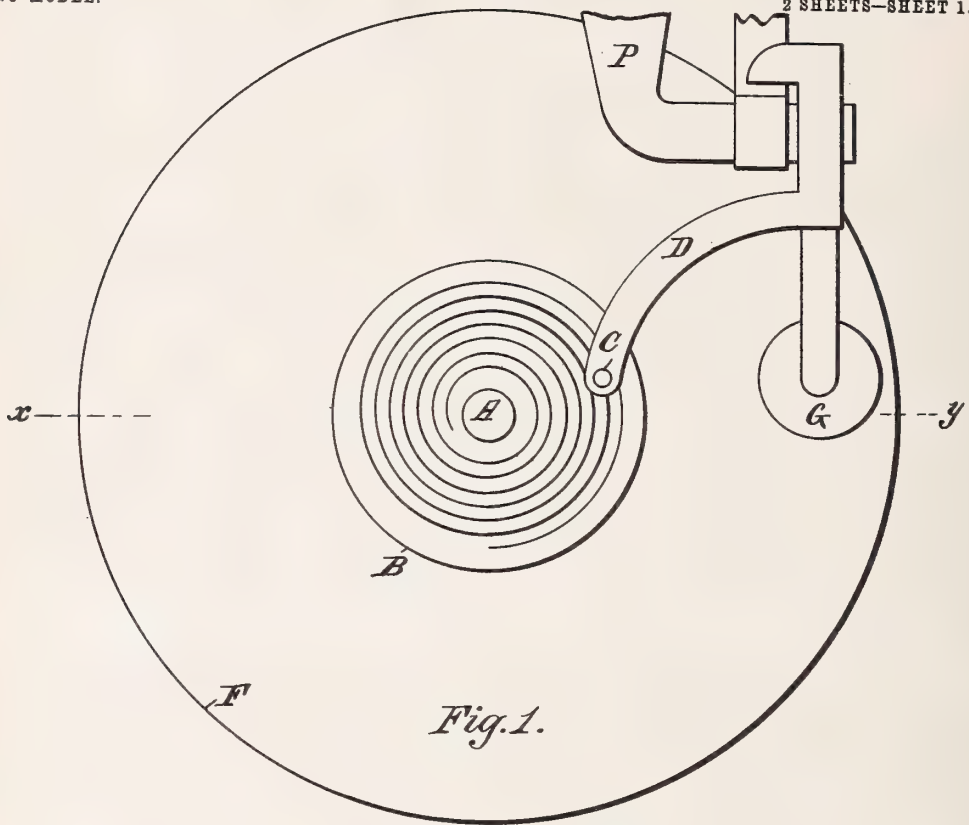


Fig. 1.

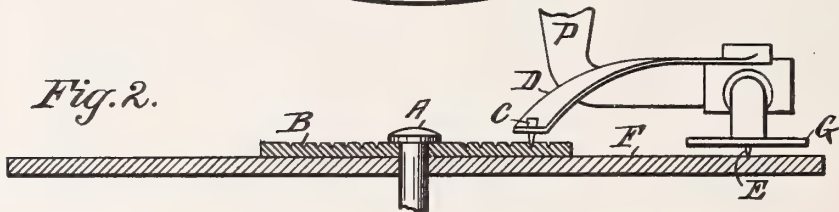


Fig. 2.

Witnesses:

Wm. H. ...
Hugo Ruppel Jr.

Inventor.

Alfred Clark, by
Frank C. Fischer, Atty.

759,348

No. 759,348.

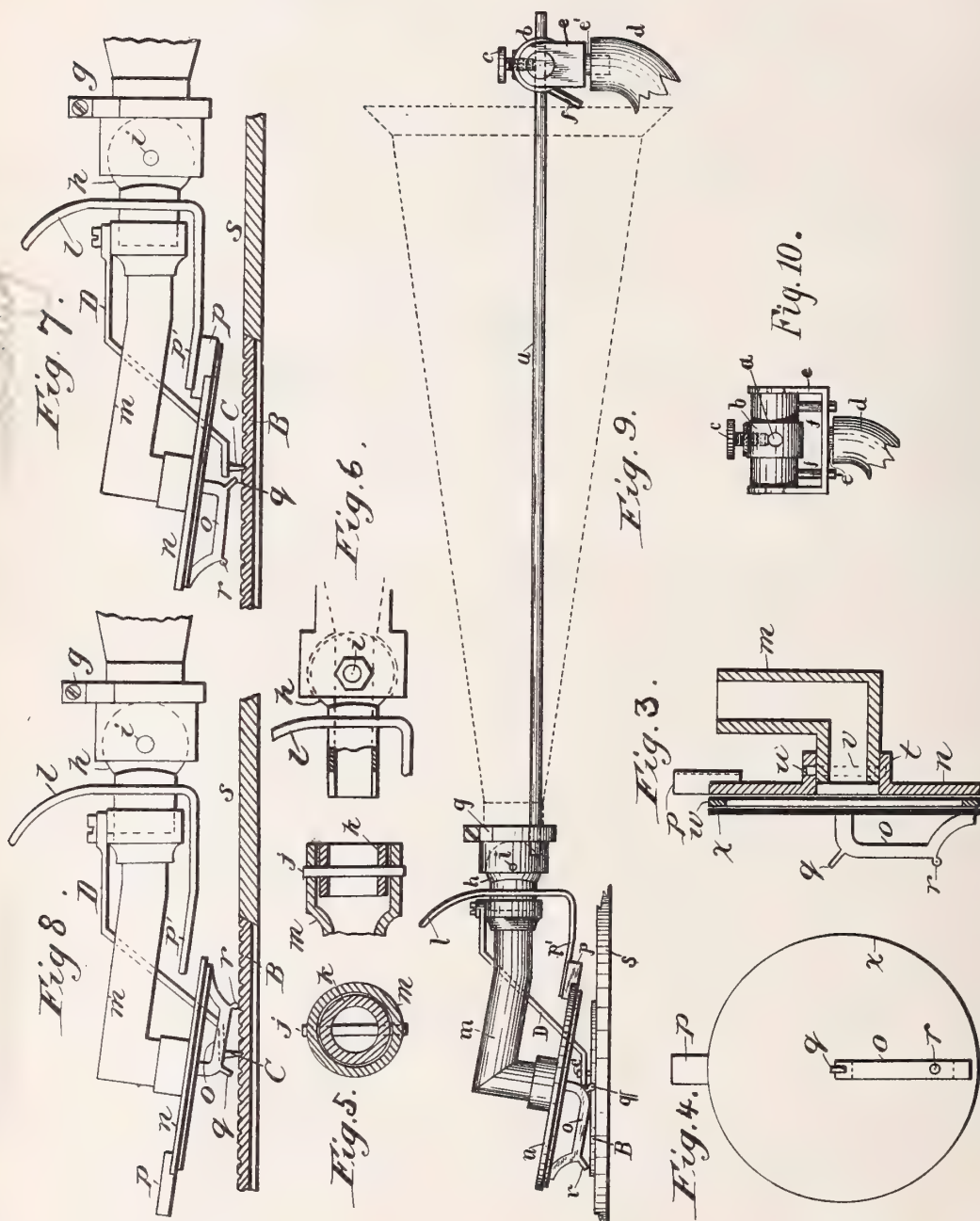
PATENTED MAY 10, 1904.

A. CLARK.
GRAMOPHONE OR TALKING MACHINE.

APPLICATION FILED APR. 26, 1902.

NO MODEL.

2 SHEETS—SHEET 2.



WITNESSES:
L. M. Sanders
Harvey B. Ellis

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Alfred Clark
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ATTORNEY

UNITED STATES PATENT OFFICE.

ALFRED CLARK, OF PARIS, FRANCE.

GRAMOPHONE OR TALKING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,348, dated May 10, 1904.

Application filed April 26, 1902. Serial No. 104,744. (No model.)

To all whom it may concern:

Be it known that I, ALFRED CLARK, a citizen of the United States of America, and a resident of the city of Paris, Republic of France, have invented certain new and useful Improvements in Sound Recording and Reproducing Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to sound recording and reproducing machines commonly known in the trade as "disk" machines; and the main object of my invention is to so improve on the machines heretofore made that the user of a machine may use the same machine for making records as well as for reproducing records of sound-vibrations.

Heretofore the sale on disk talking-machines was limited, owing to the fact that persons desiring to make their own records, as well as to reproduce them, were obliged to use a complicated and very expensive machine.

In carrying my invention into effect I provide a disk record-tablet made wholly or partially of wax or wax-like material or any other material capable of being cut into by the recording point or stylus, so as to remove or displace the material of the tablet in forming the record-groove, and in order to provide a simple form of sound-box which may be readily employed in the making and reproduction of said record and one capable of simple operation I provide a diaphragm carried, preferably, by a tubular supporting-arm capable of horizontal and vertical movement relative to the disk, and which diaphragm is provided with both a recording-stylus and a reproducing-tracer, either of which may be brought into operative position. In the preferred form this diaphragm is arranged to rotate on its supporting-arm to bring either the stylus or tracer into operative position, and I also provide a locking device for locking the diaphragm or its supporting-arm against horizontal movement when the recording-point is in operative position, it being understood that when the reproducing-tracer is in operative position the diaphragm will be free to move horizontally with respect to the disk, so as to

insure the accurate tracking of the tracer in the record-groove. It will also be understood that the provision for vertical movement of the diaphragm-supporting arm is designed to overcome irregularities in the surface of the disk. The movement of the diaphragm-supporting arm is independent of the horn-support, and in no wise is it affected by the same. The diaphragm-supporting arm being connected to the horn-support by a universal joint permits the diaphragm to have lateral and vertical movement independent of the lateral and vertical movement of the horn and horn-support, and the movement of the horn in no wise affects the movement of the diaphragm while the said diaphragm is being fed across the record by the record-groove. Owing to this construction the diaphragm is compelled to more readily follow the sinuosities of the record-groove and is not affected by the weight of the horn or its support.

While the essential and characteristic features of my invention are necessarily susceptible of modification, the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a plan view of a part of a talking-machine embodying my invention. Fig. 2 represents a vertical section taken on line *xy* in Fig. 1. Fig. 3 represents a sectional view of the diaphragm. Fig. 4 represents a plan view of the same. Figs. 5 and 6 represent sectional views of the diaphragm-tube, showing the play of the tube in its vertical and horizontal directions. Fig. 7 represents a side elevation of my improved recording and reproducing device arranged for recording, and Fig. 8 represents a similar view arranged for reproducing. Fig. 9 represents a side elevation of my improved recording and reproducing device arranged for reproducing, and illustrating an adjustable horn-support, and Fig. 10 is an end elevation of the same.

Similar letters of reference indicate corresponding parts on the several figures.

A represents the pivot of a disk talking-machine, upon which is mounted a wax record-disk F and the spirally-grooved clamping-cap B, which can be made of any suitable

material, preferably metal. The clamping-cap B is provided with a spiral guiding-groove which leads to the center of said cap. Engaging with the spiral groove of the clamping-cap is a guide-pin C, which is connected in any well-known manner to the arm D of the sound-box G.

The sound-box G consists of a diaphragm x and a rubber gasket w , which are attached to a rotary support n . Attached to the diaphragm x is a plate or support o , provided with both a recording-point q and a reproducing-point r .

The rotary diaphragm-support n is provided with a socket t , which is fitted to the diaphragm-tube m by means of a pin u , which engages with the groove v in said tube, thereby permitting the diaphragm to be turned at right angles to its central axis, so as to bring the recording-point q or the reproducing-point r at pleasure into contact with the record-disk F.

p is a weight secured to the diaphragm-support n and which engages with the catch p' on the lever l , thereby securing the diaphragm rigidly when so desired. The lever l also serves the purpose of raising the diaphragm when required in order to avoid any possible destructions of the impressions on the record-disk.

When the weight p is in engagement with the catch p' on the lever l , the diaphragm is absolutely rigid, so that no horizontal displacement is possible on the pivot j of the diaphragm-tube m .

It is well known that when a diaphragm is to be used for reproducing purposes more pressure is required than when used for recording purposes, and it is for this reason that I secure the weight p to the diaphragm-support n , which when it is moved away from its center or support, which in this case is the reproducing-point r , Fig. 8, it produces additional weight to the point r and more downward pressure upon the reproducing-point, and consequently the latter is more firmly applied to the disk than when recording. The weight p being no longer in engagement with the catch p' permits a very slight motion in a horizontal direction to the tubes of the diaphragm. This horizontal movement is just sufficient to permit the reproducing-point r to actually follow the path of the spiral groove.

In Fig. 7 it will be noticed that the weight p is in engagement with the catch p' of the lever l , and is therefore nearer the center or support, which in this case is the recording-point q , and it therefore produces less pressure upon the point q . It will be noted that by this construction and by the relative location of the recording-point near the center of the diaphragm and the reproducing-point away from such center a considerable excess of pressure is exerted on the reproducing-point during reproduction over that which is

exerted on the recording-point during the recording process.

It will be seen that by simply turning the rotary diaphragm-support n with the recorder from Fig. 7 it will be converted into a reproducer, as shown in Fig. 8.

Referring to Figs. 5 and 6 of the drawings, m represents the diaphragm-tube, to which is fitted a ring k by means of a pin or stud j . The ring k is passed over the extension of the articulated joint h in such a manner that the pin j engages with a slot in the said extension. This construction serves to prevent any displacement in the horizontal direction of the interior of the tubes and enables the diaphragm having attached thereto both recording and reproducing points to have a very slight lateral motion in the plane of the disk. By this construction it will be seen that the sound-box and its parts are free to swing vertically upon the pin i and horizontally upon the pin j when the reproducing-tracer is in operative relation with the record-tablet; but they are constrained to move vertically only when the recording-stylus is in such operative relation.

In talking-machines of the class described it is necessary to provide an amplifying-horn and a support for the same. In Fig. 9 I have shown my improved device as supported at the end of such a horn, (shown in dotted lines,) the horn in turn being supported by a universal connection at the outer end of the arm d , extending from the case of the machine (not shown) as usual. This arm d has an upturned outer end provided with a socket, into which is inserted the stud e' of the yoke e , thus permitting horizontal movement of the horn-support. The yoke e carries a pivoted cross-head b , through which passes the adjusting-rod a , held in place by the set-screw c . The horn is inserted in the clamping-ring g , which is supported at the outer end of the rod a and carries the diaphragm tube m and its connections, as shown. Stops f are secured in the cross-head b to limit the movement of horn-support when the diaphragm-points are not in engagement with the record. These stops also serve to hold the sound-box at the proper angle with the record by their engaging the cross-bar of the yoke b .

I am aware that changes may be made in various arrangements and combinations of the parts without departing from the scope of my invention. Hence I do not limit my invention to the exact arrangement and combination of the parts as described, nor do I confine myself to the exact shape and configuration of the same.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a diaphragm,

a support therefor provided with a universal joint thereby permitting said tube to have both vertical and lateral movement, a recording-stylus and reproducing-tracer coöperating therewith, means whereby either the stylus or the tracer may be brought into operative position relative to the tablet, while maintaining the other out of operative position, and a locking device designed to hold the diaphragm-support against lateral movement when the recording-stylus is in operative position.

2. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a rotary diaphragm, a support therefor provided with a universal joint thereby permitting said tube to have both vertical and lateral movement, a recording-stylus and a reproducing-tracer attached to said diaphragm and arranged so that when either is in operative position on the tablet said diaphragm will be held at an angle to the tablet thereby maintaining the other out of operative position, and a locking device designed to hold the diaphragm-support against lateral movement when the stylus is in operative position.

3. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a diaphragm, a recording-stylus and a reproducing-tracer coöperating therewith, means whereby either the stylus or the tracer may be brought into operative position relative to the tablet, while maintaining the other out of operative position, and a diaphragm-tube having a universal joint thereby permitting said tube to have both vertical and lateral movement and means to constrain the movement of said support to one direction only.

4. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a diaphragm, a recording-stylus and a reproducing-tracer coöperating therewith, means whereby either the stylus or the tracer may be brought into operative position relative to the tablet while maintaining the other out of operative position, a diaphragm-tube having a universal joint thereby permitting said diaphragm to have both vertical and lateral movement, and a locking device designed to hold the diaphragm-tube against lateral movement when the stylus is in operative position.

5. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a spiral groove, of a rotary diaphragm, a recording-stylus and a reproducing-tracer attached to said diaphragm and arranged so that when either is in operative position on the tablet said diaphragm will be held at an angle to the tablet thereby maintaining the other out of operative position, a diaphragm-tube having a universal joint thereby permitting said tube to have both vertical and lateral movement, and a locking

device designed to hold the diaphragm-support against lateral movement when the stylus is in operative position.

6. In a talking-machine, a diaphragm having a plate or support inclined to the record-tablet and provided with a recording-stylus and a reproducing-tracer and capable of being turned at right angles to its central axis and provided with a weighted catch, a locking-lever adapted to engage said catch for locking the diaphragm-plate when the stylus is in operative relation with the tablet, the weighted catch operating to increase the pressure upon the tracer when it is in operative position, substantially as described.

7. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a diaphragm, a support therefor hinged to move toward and away from the tablet, a recording-stylus and a reproducing-tracer, a weighted catch, and means whereby either the stylus or the tracer may be brought into operative position relative to the tablet, while maintaining the other out of operative position.

8. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a spiral groove, of a diaphragm, a recording-stylus and a reproducing-tracer, a diaphragm-tube provided with a universal joint thereby permitting said tube to have both vertical and lateral movement, a locking device designed to hold the diaphragm-tube against lateral movement when the stylus is in operative position, and means whereby the stylus or tracer may be brought into operative position relative to the tablet while maintaining the other out of operative position.

9. In a talking-machine, the combination with a record-tablet, in the form of a groove, of a diaphragm, a recording-stylus and a reproducing-tracer, a diaphragm-support having a joint to permit movement of the diaphragm in all directions, a weight on said diaphragm-support, a locking-lever adapted to engage said weight for locking the diaphragm-plate against lateral movement when the stylus is in operative relation with the tablet, said weight operating to increase the pressure at the tracer, substantially as described.

10. In a talking-machine, the combination with a record-tablet adapted to receive a record in the form of a groove, of a rotary diaphragm, a recording-stylus and a reproducing-tracer attached to said diaphragm and arranged so that when either is in operative position on the tablet said diaphragm will be held at an angle to the tablet, thereby maintaining the other out of operative position, a universally-pivoted supporting-arm carrying said diaphragm, a weight on the said diaphragm-support for maintaining the tracer in contact with the bottom of the record-groove, and a locking-lever adapted to engage the weight for locking the diaphragm-plate

against lateral movement when the stylus is in operative relation with the tablet, substantially as described.

11. In a talking-machine, the combination
5 with a wax-like tablet adapted to receive a record-groove, a plate provided with a guide-groove, a rotary diaphragm, a universally-pivoted supporting-arm carrying said diaphragm, a recording-stylus mounted on said
10 diaphragm, a reproducing-tracer also mounted on said diaphragm, either of which may be brought into operative position by a rotary movement of the diaphragm, a locking device for locking the diaphragm-supporting
15 arm against lateral movement when the recording-stylus is in operative position, and a guide-pin engaging said guide-groove, substantially as described.

12. In a talking-machine, the combination
20 with a wax-like tablet adapted to receive a record-groove, a plate provided with a guide-groove, a rotary diaphragm, a universally-pivoted supporting-arm carrying said diaphragm, a recording-stylus mounted on said
25 diaphragm, a reproducing-tracer also mounted on said diaphragm, either of which may be brought into operative position by a rotary movement of the diaphragm, a weight on said diaphragm-support for maintaining the tracer
30 in contact with the bottom of the record-groove, and a guide-pin engaging said guide-groove, substantially as set forth.

13. In a talking-machine, the combination with a wax-like tablet adapted to receive a
35 record-groove and a guide-groove, a rotary diaphragm, a universally-pivoted supporting-arm carrying said diaphragm, a recording-stylus mounted on said diaphragm, a reproducing-tracer also mounted on said diaphragm,
40 either of which may be brought into operative position by a rotary movement of the diaphragm, a locking device for locking the diaphragm-supporting arm against lateral movement when the recording-stylus is in
45 operative position, a weight on said diaphragm-support for maintaining the tracer in contact with the bottom of the record-groove, said weight constituting one member of said locking device and a guide-pin engaging
50 with said guide-groove, substantially as set forth.

14. In a talking-machine the combination of a rotary diaphragm-support, a diaphragm-tube upon which said diaphragm-support is
55 mounted, means for permitting said tube to oscillate either vertically or laterally and means to limit the oscillation of said tube in but one direction only.

15. In a talking-machine, the combination of a diaphragm having secured thereto a recording-stylus and a reproducing-tracer, a diaphragm-tube, a universally-pivoted support for said diaphragm-tube, means for permitting universal movement of said tube and for permitting movement in a single direction only. 60 65

16. In a talking-machine, the combination of a rotary diaphragm, a universally-pivoted support therefor, a locking device for said diaphragm, whereby when said device is unlocked said diaphragm may have vertical and lateral movement and when said device is locked, the said diaphragm is limited to vertical movement only. 70

17. In a talking-machine, the combination of a sound-box, provided with a rotary diaphragm-support, carrying a diaphragm, a recording-point and a reproducing-point secured to said diaphragm, and a weight mounted on said diaphragm-support to increase the pressure upon the reproducing-point over that upon the recording-point, by the rotation of the diaphragm-support. 75 80

18. In a talking-machine, the combination of a horn-support and a diaphragm-tube, a universal joint between said support and said tube 85 thereby permitting both vertical and lateral oscillations of said tube, and means for limiting the movement of said tube to a single direction only.

19. In a talking-machine the combination of 90 a horn-support and a diaphragm-tube, a universal joint connecting said tube to said support, permitting both vertical and lateral movement of said tube and a locking device for said support and tube whereby the movement of said tube may be limited to a single direction only. 95

20. In a talking-machine the combination of a horn-support and a diaphragm-tube, a universal joint connecting said support and said tube, for permitting both vertical and lateral movement of said tube, and a locking device for said support and said tube for limiting said tube to vertical movement. 100

21. In a talking-machine, the combination of a horn-support and a diaphragm-tube, a universal joint connecting said tube and said support, for permitting both vertical and lateral movement of said tube, and a locking device for said support and said tube, for holding the tube against lateral movement. 105 110

This specification signed and witnessed this 15th day of April, 1902.

ALFRED CLARK.

Witnesses:

EDWARD P. MACLEAN,
PAUL F. PAQUET.

759,639.

No. 759,639.

PATENTED MAY 10, 1904.

H. SHEBLE.
HORN FOR TALKING MACHINES.
APPLICATION FILED JULY 21, 1903.

NO MODEL.

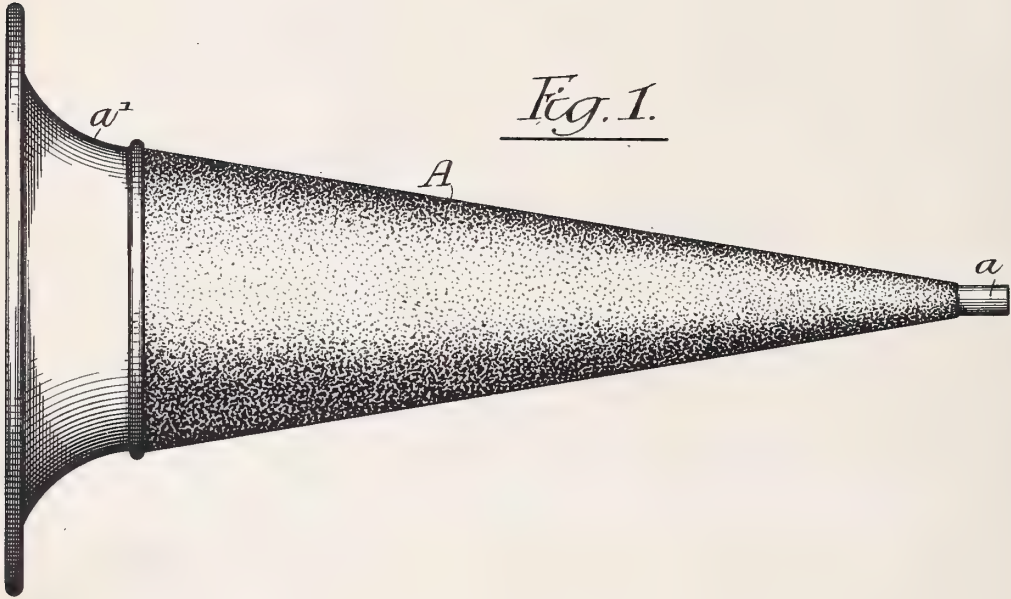


Fig. 1.

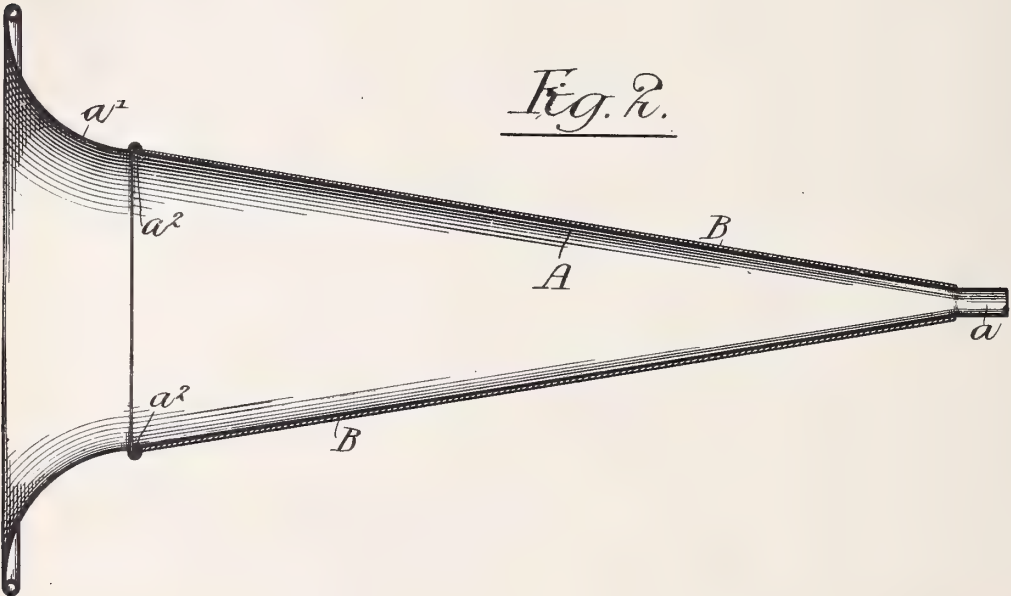


Fig. 2.

Witnesses:-

Hamilton D. Turner
Herman E. Metrus

Inventor:-

Horace Sheble,
by his Attorneys

Howson & Howson

UNITED STATES PATENT OFFICE.

HORACE SHEBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
HAWTHORNE & SHEBLE MANUFACTURING COMPANY, OF PHILA-
DELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

HORN FOR TALKING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 759,639, dated May 10, 1904.

Application filed July 21, 1903. Serial No. 166,449. (No model.)

To all whom it may concern:

Be it known that I, HORACE SHEBLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Horns for Talking-Machines, of which the following is a specification.

My invention consists of an improvement in the construction of horns primarily designed to be connected to the conduit leading from the vibrating diaphragm or sound-box of a talking-machine of any of the well-known forms, the object of the invention being to provide means for damping or preventing the vibrations of the metal of which the horn is composed, which heretofore have ordinarily interfered with the vibration of the column of air within the horn, so as to give a more or less objectionable quality to the music or other sounds reproduced by the machine to which the horn is attached.

A further object of the invention is to provide means whereby the appearance of a horn of the character above noted may be greatly enhanced, said means being of such a nature as to be durable.

These objects I attain as hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a horn for use in connection with a talking-machine, being illustrated as provided with a covering according to my invention. Fig. 2 is a sectional elevation of the horn shown in Fig. 1, showing the detail construction of the same.

In horns for the purpose noted it has hitherto been customary to construct them of either polished brass or bronze throughout their entire length or to simply have them polished at their mouth or bell, while covering with black japan or other similar material the body or conical portion. To those accustomed to the use of machines for reproducing sound it is well known that hitherto there has always been present an objectionable metallic note produced by the machine when in operation, due in a great measure to the fact that the

vibrating column of air within the horn sets in vibration the metal of the horn itself, which in turn causes vibrations of air, so as to give rise to the objectionable note or tone mentioned. I have found, however, that by covering the body or conical portion of the horn with a layer of cloth, preferably adherent to the horn, the quality of the sound reproductions is greatly improved and that with the entire absence of the objectionable metallic sound heretofore always present.

In the above-mentioned drawings, A is the body or conical portion of a horn formed of metal, as is usually the case, and having at its smaller end a cylindrical nozzle *a* for attachment to the tube connected to the sound-box containing the vibrating diaphragm of the talking-machine.

a' is the bell or mouth of the horn and is held, as customary, to the large end of the body portion A by means of a turned-over edge in engagement with a flange *a''* on said body portion.

B is a layer of cloth preferably extending over the entire surface of the body portion A and being held thereon by glue, varnish, or any other desired material. Not only does this coating of cloth dampen the vibrations of the metal horn, and thereby improve the quality of the sounds reproduced by the machine, but it gives a finished appearance to the body portion of said horn and is itself of such a nature as not to be easily injured or disfigured. This is quite an important feature, as the japan or varnish hitherto used is very easily scratched, with consequent injury to the appearance of the horn.

I claim as my invention—

1. As a new article of manufacture, a horn for talking-machines, the same having a substantially conical body portion of relatively stiff sheet metal and having a covering of woven fabric upon said body portion, said fabric being permanently retained in intimate contact with the body, substantially as described.

2. As a new article of manufacture, a horn
for a talking-machine, the same including a
conical body portion and a mouthpiece there-
for, said parts being of relatively stiff sheet
5 metal with a covering of cloth glued to the
said body portion of the horn, substantially
as described.

In testimony whereof I have signed my name
to this specification in the presence of two sub-
scribing witnesses.

HORACE SHEBLE.

Witnesses:

CHAS. SULZNER,
MARIE E. DONIGAN.

760,606

No. 760,606.

PATENTED MAY 24, 1904.

T. B. BIRNBAUM.
RECORD PLATE FOR GRAMOPHONES.
APPLICATION FILED DEC. 24, 1900.

NO MODEL.

Fig. 1.

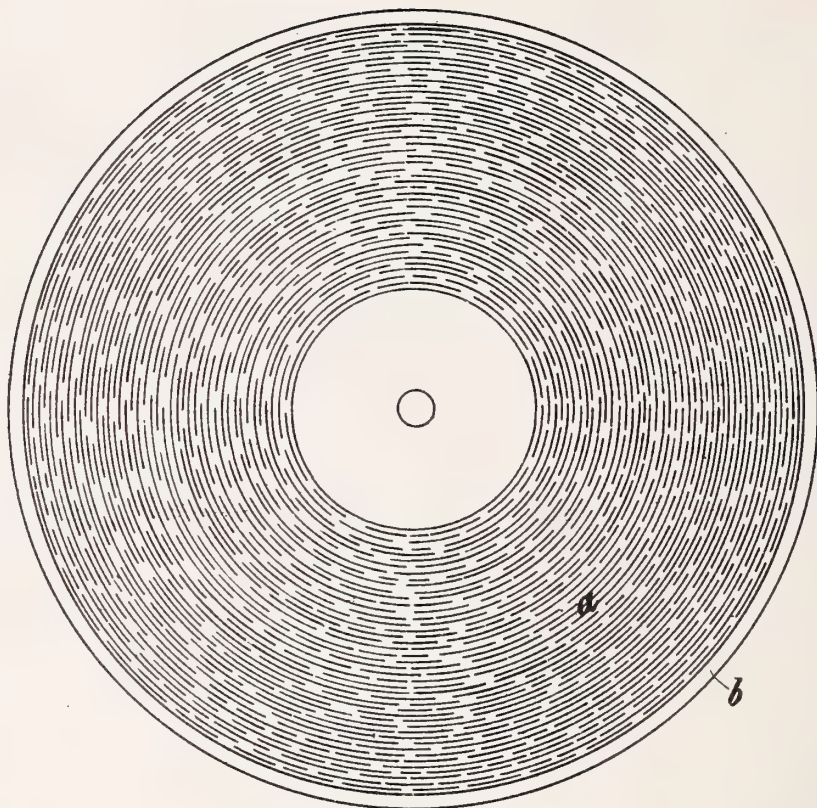
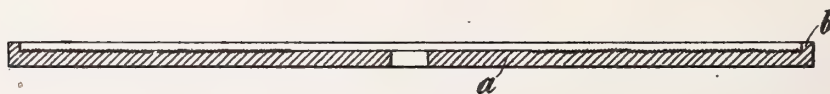


Fig. 2.



Witnesses:
Henry Hasper.
Hobert Haupt

Inventor:
Charles B. Birnbaum

UNITED STATES PATENT OFFICE.

THEODORE B. BIRNBAUM, OF BERLIN, GERMANY.

RECORD-PLATE FOR GRAMOPHONES.

SPECIFICATION forming part of Letters Patent No. 760,606, dated May 24, 1904.

Application filed December 24, 1900. Serial No. 40,947. (No model.)

To all whom it may concern:

Be it known that I, THEODORE B. BIRNBAUM, managing director, a subject of the Queen of Great Britain and Ireland, residing at 36 Ritterstrasse, in the city of Berlin, in the German Empire, have invented certain new and useful Improvements in Record-Plates for Gramophones, of which the following is a specification.

The record-plates for gramophones are made of circular disks of hard rubber or similar material of about one-tenth inch thickness. These plates or tablets are, as a rule, fitted with an aperture for the reception of the rotating shaft when the gramophone is placed upon its turn-table. Upon the surface of the record-tablet the phonographic record-line is engraved, forming a spiral-like groove, serving to guide the gramophone-needle which is connected to the sounding-drum. Upon the rotation of the record-tablet the needle moves in the spiral-like groove from the edge of the tablet to the center thereof, corresponding to the configuration and the extent of the said spiral groove. The commencing point of the record-line is accordingly arranged near the periphery of the tablet about one-fifth of an inch from its outer edge. With this form of arrangement of gramophone record-tablets it is a great inconvenience that it requires a certain amount of skill to introduce the needle into the outer extremity of the record-line, a very serious drawback, which is especially troublesome if short-sighted persons want to make use of the gramophone. Furthermore, it frequently happens, unless great care is taken in positioning the needle upon the record-tablet, that the needle glides off the edge of the said tablet and strikes against the driving-gear of the contrivance, whereby the needle becomes bent or has its point broken off or blunted, and thus becomes unfit for use.

In the accompanying drawings, Figure 1 is a plan view of a gramophone-plate constructed in accordance with my invention, and Fig. 2 is a transverse section thereof.

As will be seen from Figs. 1 and 2 of the drawings, the outer edge of the record-tablet *a* is provided with an annular projection *b*,

which projects about one twenty-fifth to one-tenth of an inch upon the upper surface of the said tablet. The spirally-wound record-line is so arranged upon the record-tablet as to start directly at the projecting edge *b* or in the proximity thereof. To start the gramophone, it is only necessary to place the point of the needle close to the projecting rim *b* of the plate *a*. Thus it is possible to operate the gramophone even in a dark room and without the necessity of special skill or experience in handling, inasmuch as the touch will afford a sufficient guide to the operator for the adjustment of the needle upon the gramophone-tablet in the proper position for actuating the apparatus. The projecting rim presents the further advantage of a far more efficient protection against injury from exterior influences of the upper part of the tablet, which contains the spirally-wound record-line. If a number of record-tablets constructed according to my invention are placed on top of each other, the tablet bearing the record-groove is not touched at all by the upper tablet in view of the latter resting upon the rim *b* of the lower tablet or plate *a*. Then the thick edge affords a greater security against breakage, and thus renders the tablet more durable.

What I claim, and desire to secure by Letters Patent of the United States, is—

A flat gramophone-plate provided with an integral annular rim projecting above its record-surface at the extreme outer edge of the plate and the said surface having a spirally-arranged record-line formed therein, said line beginning close to the inner side of said rim and terminating at a point remote from the rim near the center, said rim being adapted to guide the gramophone-needle into the beginning of the record-line, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THEODORE B. BIRNBAUM.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.



76-255

No. 760,655.

PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 1.

Fig. 4.

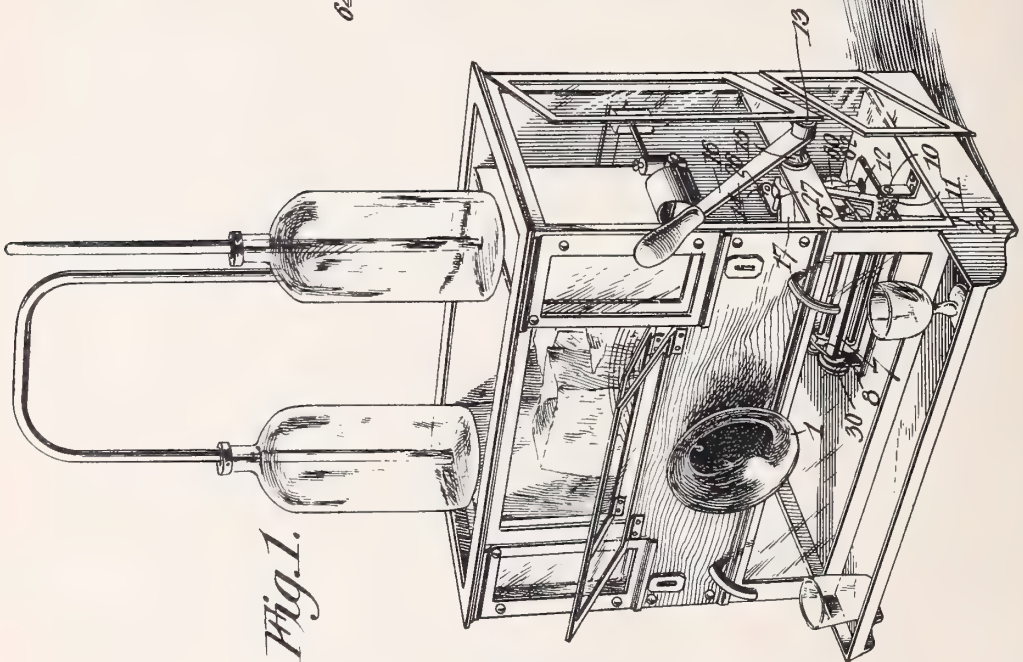
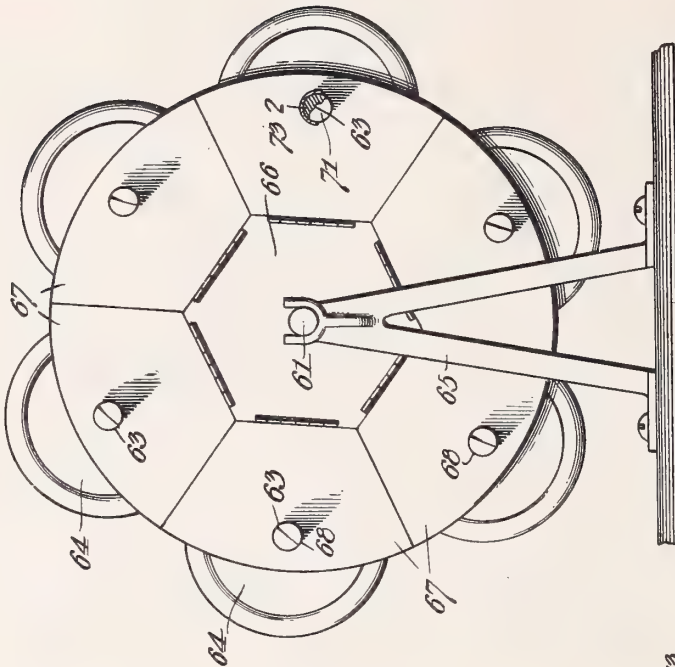


Fig. 1.

Witnesses
E. H. Stewart
Geo. E. Parker

Thomas F. Solon, Inventor.
by *C. A. Snow & Co.* Attorneys

No. 760,655.

PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 2.

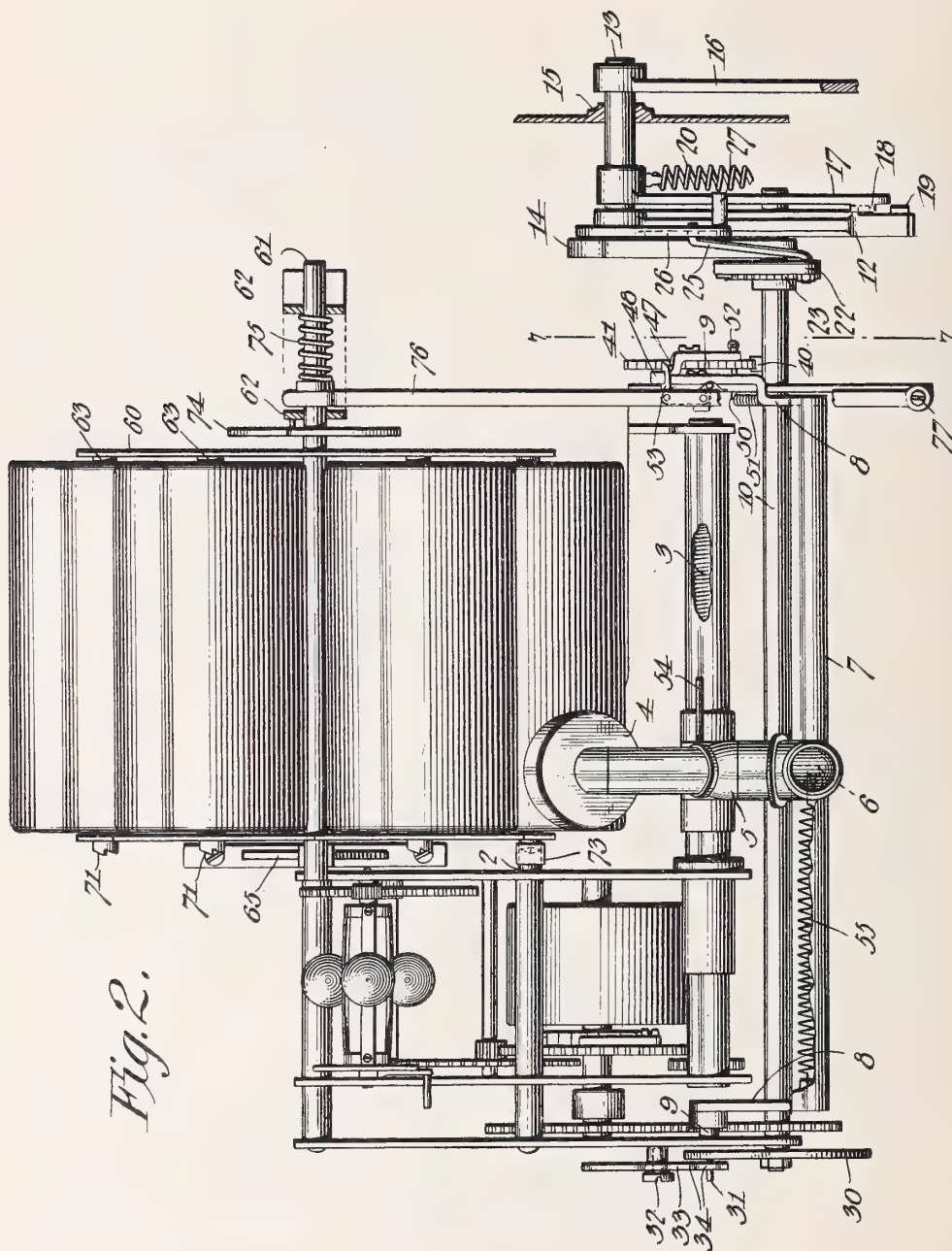


Fig. 2.

Witnesses
E. Stewart
Geo E Parker

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by *C. A. Snow & Co*
Attorneys

No. 760,655.

PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 3.

Fig. 7.

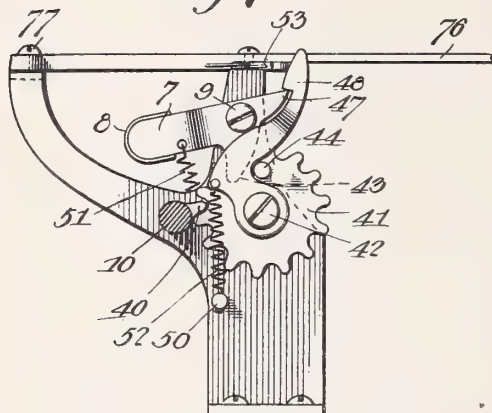


Fig. 8.

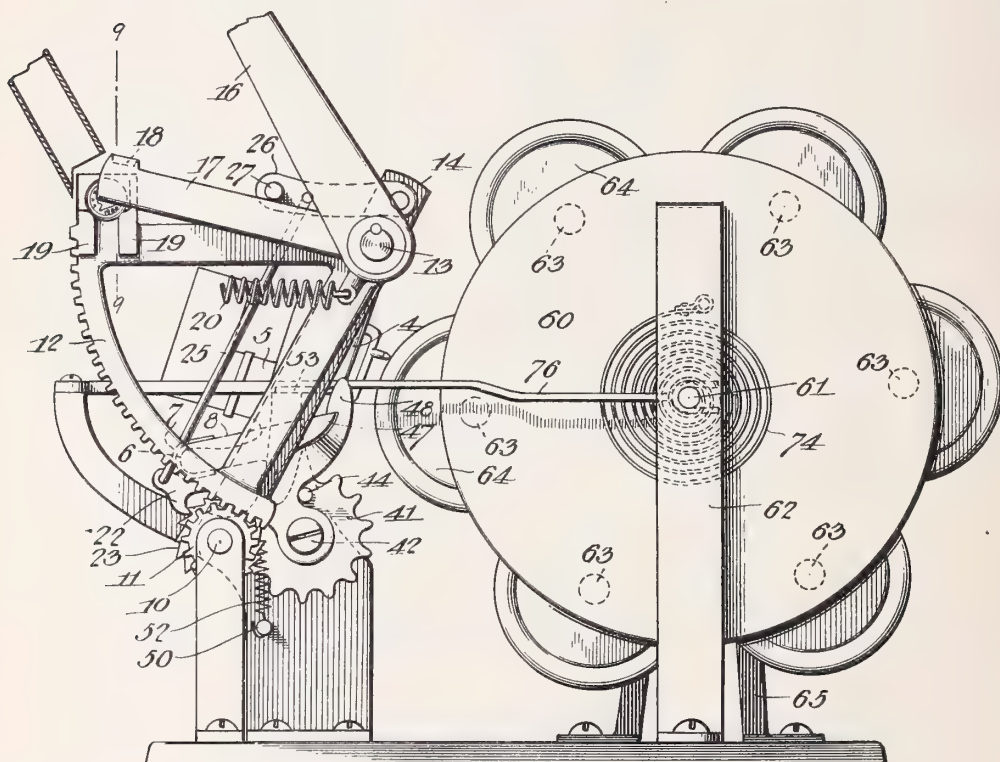
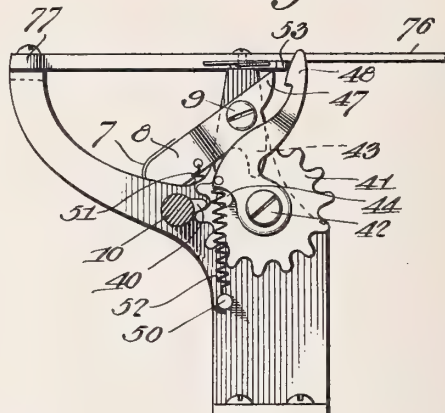


Fig. 3.

Witnesses
E. C. Stewart
John E. Carter

Thomas F. Solon, Inventor.
by *Chas. Snow & Co.*
Attorneys

No. 760,655.

PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 4.

Fig. 5.

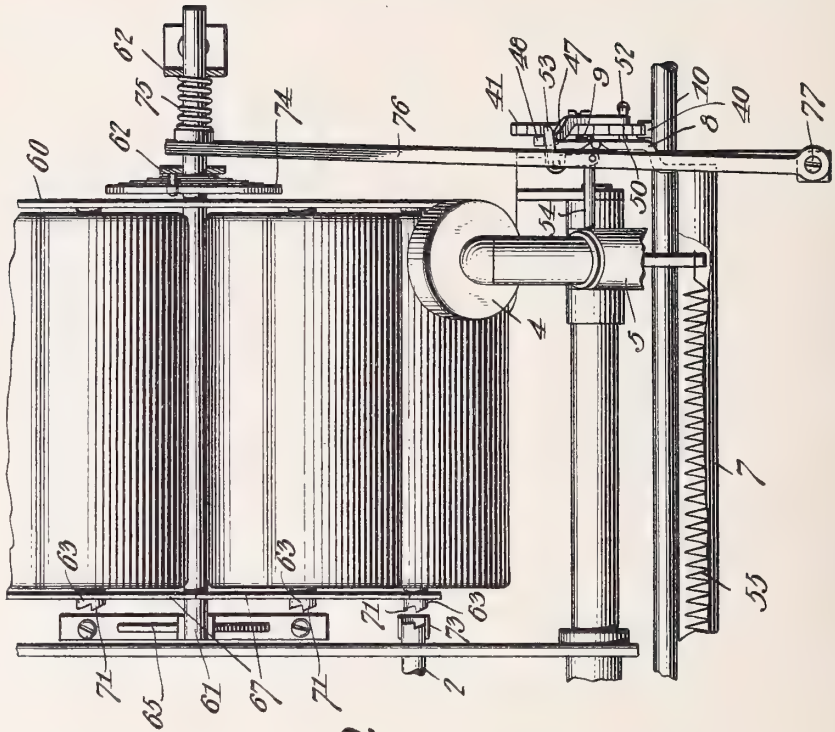


Fig. 10.

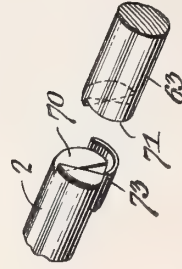


Fig. 6.

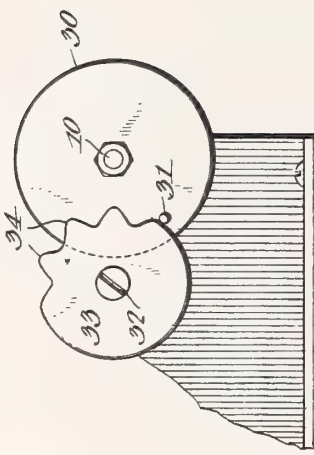
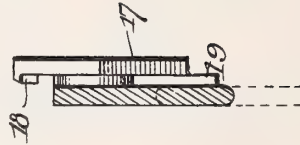


Fig. 9.



Witnesses
E. H. Stewart
Geo. E. Parker

Thomas F. Solon, Inventor.
by *C. A. Snow & Co.*
Attorneys

No. 760,655.

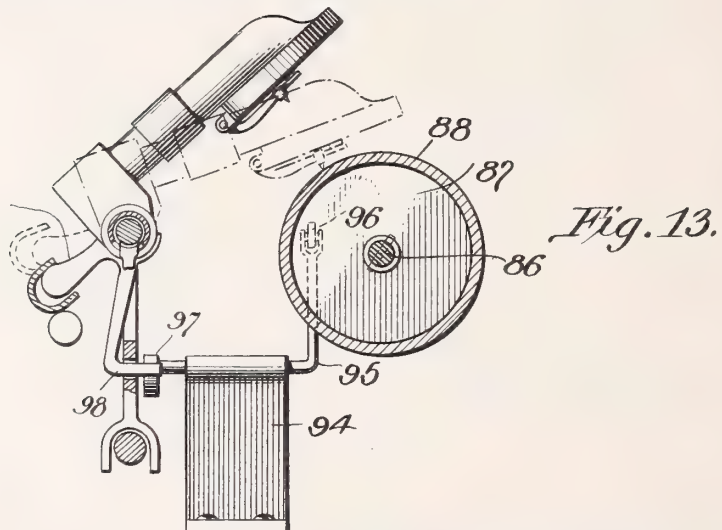
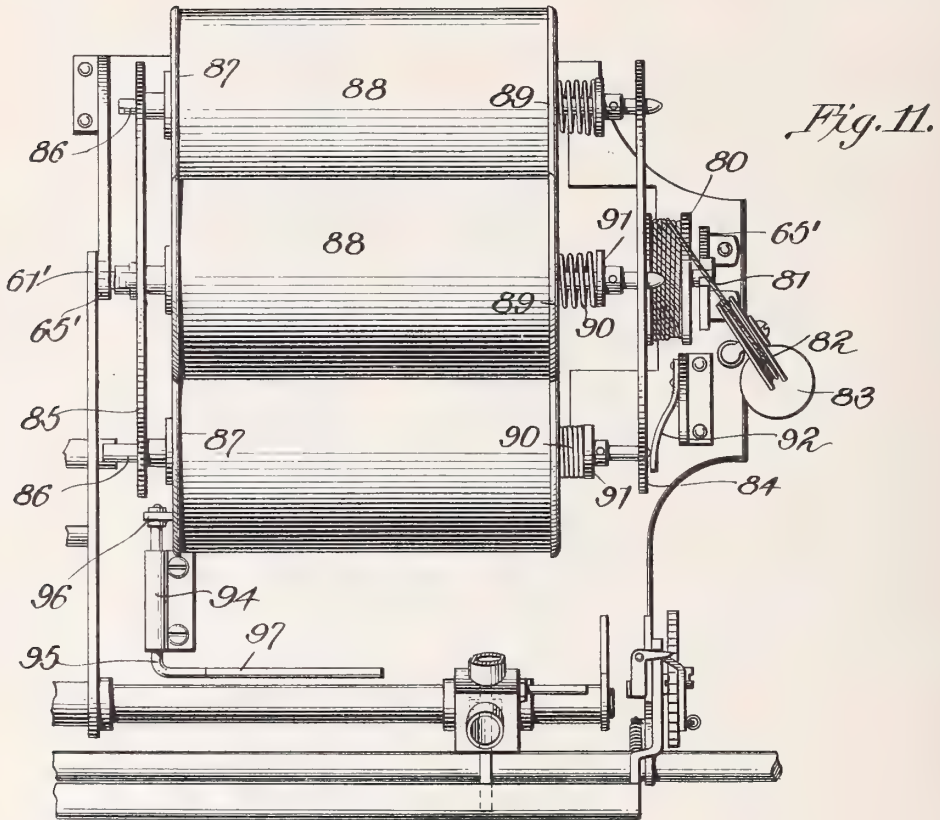
PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 5.



Witnesses
E. W. Stewart
J. W. E. Parker

Thomas F. Solon, Inventor.
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Attorneys

760,655

No. 760,655.

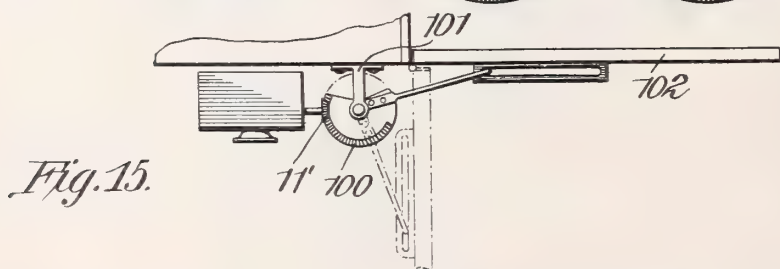
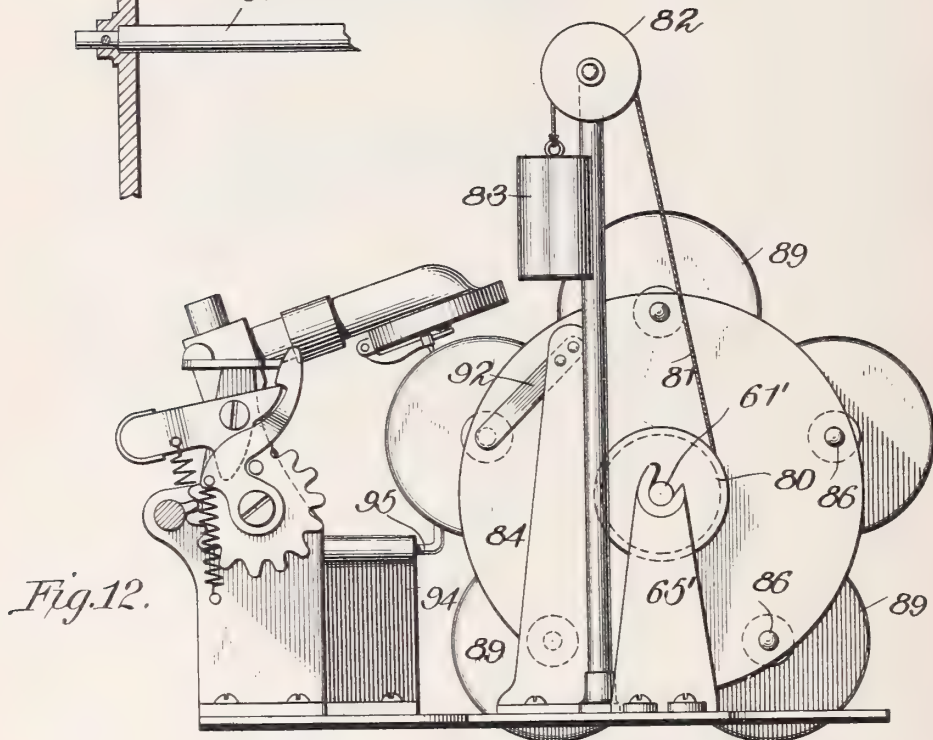
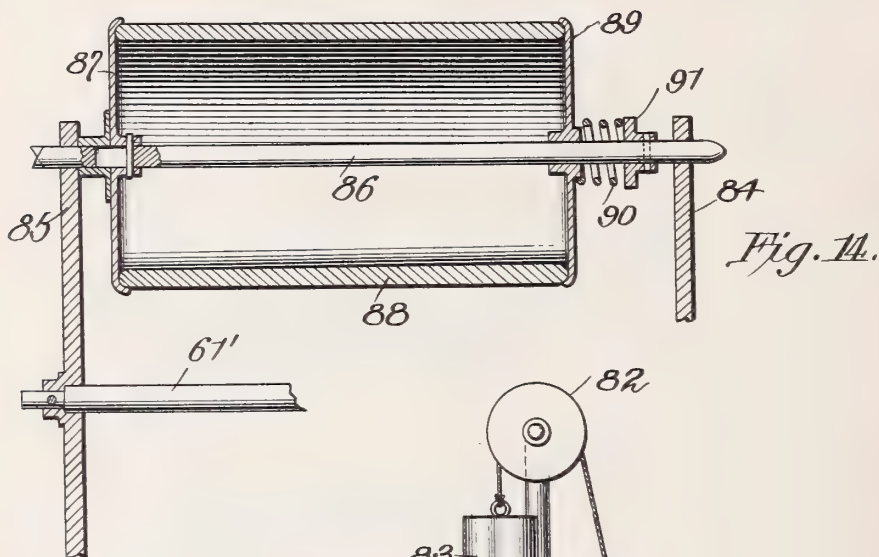
PATENTED MAY 24, 1904.

T. F. SOLON.
PHONOGRAPH.

APPLICATION FILED SEPT. 1, 1903.

NO MODEL.

6 SHEETS—SHEET 6.



Witnesses
E. J. Stewart
Jno. C. Parker

Thomas F. Solon, Inventor.
by *Cashnow & Co.*
Attorneys

UNITED STATES PATENT OFFICE.

THOMAS F. SOLON, OF SOLON SPRINGS, WISCONSIN.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 760,655, dated May 24, 1904.

Application filed September 1, 1903. Serial No. 171,575. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. SOLON, a citizen of the United States, residing at Solon Springs, in the county of Douglas and State of Wisconsin, have invented a new and useful Phonograph, of which the following is a specification.

This invention relates to certain improvements in phonographs and similar sound-reproducing machines, and has for its principal object to provide a novel form of mechanism in which a plurality of records are mounted on a carrier which may be revolved automatically to present the records successively to the sound-box.

A further object of the invention is to provide in graphophones, phonographs, and similar sound-reproducing machines for the stopping of the operation of the machine before the sound-box has traversed the entire record, so that said record may contain a number of different speeches, catch phrases, epigrams, and the like, which may be repeated in consecutive order, the sound-box and record stopping at intervals between successive short-sound records and returning movement of the sound-box being prevented until the end of the cylinder is reached.

A still further object of the invention is to provide a device of this character in which provision is made for the employment of a plurality of records which are successively adjusted to operative position with respect to the threaded sound-box-traversing shaft of the talking-machine, the adjusting apparatus being automatic in its operation and serving to present a fresh record after the sound-box has entirely completed the reproduction of a previous record.

A still further object of the invention is to provide a novel form of mechanism automatically set into operation at the completion of a sound-reproducing period and serving at one movement to adjust the parts to position for the return of the sound-box to the starting end of the machine and to permit of the movement of a fresh record to the proper position with respect to the motor-shaft.

With these and other objects in view the invention consists in the novel construction and

arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a general perspective view of a vending-machine constructed in accordance with my invention. Fig. 2 is a plan view, partly in section, of the sound-reproducing machine. Fig. 3 is an end elevation of the sound-reproducing machine. Fig. 4 is an elevation of a portion of the carrier or support for a plurality of records. Fig. 5 is a partial plan view showing the movement of some of the parts when the sound-box has completed the reproduction of an entire record. Fig. 6 is an elevation looking from the left-hand end of the machine and showing the means for limiting the winding and the reproducing movements of the machine. Fig. 7 is a transverse sectional elevation of a portion of the machine on the line 7 7 of Fig. 2. Fig. 8 is a view similar to Fig. 7, the parts being illustrated in different position. Fig. 9 is a detail sectional view of a portion of the device on the line 9 9 of Fig. 3. Fig. 10 is a detail perspective view illustrating the clutch connection between the main and one of the auxiliary mandrel-shafts. Fig. 11 is a plan view illustrating a modified construction of the multiple-record carrier. Fig. 12 is an end elevation of the same. Fig. 13 is a transverse sectional view showing the mounting of the sound-box. Fig. 14 is a detail sectional view through a portion of one of the sound-records, illustrating the construction and arrangement of the multiple-record carrier shown in Figs. 11 and 12. Fig. 15 illustrates a slight modification hereinafter referred to.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

While the machine forming the subject of the present invention may be employed in the same manner as other sound-reproducing machines for the reproduction of musical selec-

tions and the like on the insertion of a coin of proper denomination, it is principally intended for use in connection with a vending apparatus so arranged that a single operating-lever may set both into operation, and the inserted coin acting first to release the mechanism of the vending device and then to release the normally locked sound-reproducing machine, the latter carrying records, preferably in the nature of catch phrases, witty remarks, or short sentences extolling or advertising the goods delivered by the vending-machine.

The vending-machine shown in the drawings is one of that class employed for the dispensing of beverages which may be delivered from the original packages, the bottles or other vessels containing the beverages being placed on top or within the casing of the machine and connected by suitable tubes to measuring devices which deliver to the customer a predetermined quantity of the liquid. The sound-reproducing machine, preferably of the graphophone type, is arranged within the lower portion of the casing, and its sound-box is connected by a flexible tube to a trumpet 1, opening at the front of the casing, or is otherwise connected to the ear-tubes in any manner common to sound-reproducing machines. The sound-reproducing machine is provided with a spring-motor of the usual type, connected to a governor and to the mandrel-shaft 2, which actuates the cylindrical record. The spring-motor is further connected to the usual threaded shaft 3, which operates in the usual manner to impart longitudinal movement to a sound-box 4, carried by a frame 5. At the front of the frame is the usual handle 6, which may be moved up to place the sound-box in contact with the record or depressed to disengage the sound-box from the record and the nut of the sound-box frame from the threaded shaft. The handle 6 extends within a trough-shaped bar 7, which is connected at opposite ends of the frame to the arms 8, mounted on pivot-pins 9 and provided with mechanism hereinafter described for either raising or depressing the trough to adjust the position of the sound-box. In the front portion of the frame is journaled the winding-shaft 10, having the usual gearing connections with the spring-carrying shaft, and at one end of said winding-shaft is secured a pinion 11, with which meshes a segment 12, mounted loosely on a shaft 13, the shaft being supported at one end by a bracket-arm 14, extending upward from the winding-shaft, while the opposite end of said segment-carrying shaft passes through a suitable bearing 15, formed in one end of the casing. To the outer end of the shaft 13 is secured an operating-lever 16, having a suitable handle which may be grasped by the person inserting the coin and depressed to effect the winding of the spring. To this shaft is also secured an

arm 17, provided at its outer end with an overhanging tongue 18, projecting in the direction of the segment, and said segment is provided with a pair of spaced lugs 19, forming a seat for an inserted coin, the coin being conducted to the seat by means of a suitable chute.

To the hub of the arm 17 is secured a pin forming a connection for one end of a contractile spring 20, the opposite end of which is secured to a fixed point, such as the end of the bar 7, and serves to return the arm and the operating-lever to initial positions after each movement. When the lever and arm are depressed after the insertion of the coin, the latter is caught by the tongue 18, and as it cannot move downwardly between the lugs 19 the movement of the lever is imparted to the segment, said segment turning and through the pinion 11 revolving the winding-shaft 10. Should no coin be placed in the seat formed by the lugs, the tongue will pass between said lugs without effecting operative movement of the segment. When the spring is wound, it is retained in the wound position by means of a pawl 22, pivoted to the bracket-arm and engaging a ratchet-wheel 23, secured to the winding-shaft. The outer end of the pawl is connected by a rod 25 to an arm 26, pivoted to a stud near the upper end of the bracket-arm, and said arm 26 has a laterally-projecting pin 27 disposed in the path of movement of the arm 17, so that when the latter ascends under the influence of the spring 18 the pin will be raised and effect a corresponding movement of pawl 22, the latter moving from engagement with the ratchet-wheel, and permit the wound spring to set the mechanism into operation.

As the sound-records are intended to be comparatively short, it becomes necessary to employ a mechanism for positively stopping the movement of the record and the travel of the sound-box at a predetermined period. For this purpose the left-hand end of the winding-shaft 10 is provided with a disk 30, from which projects a pin 31. At a convenient point on the frame of the machine is a stud 32, carrying a disk 33, provided with a number of teeth 34, which may be engaged by the pin 31 as the winding-shaft and disk 30 are rotated. During the winding movement of the shaft the pin 31 moves from engagement with the circular periphery of the disk 33 and after one complete revolution of the disk 30 enters the space between two of the teeth 34 and revolves said disk 33 to the extent of a single tooth, this operation being repeated at each complete rotation of the disk 30 until the pin 31 finally comes into contact with a solid portion of the periphery of disk 33, at which time the winding operation must cease. When the winding-shaft is released and allowed to revolve in the opposite direction under the influence of the spring, the disk 33 is again turned in a

similar manner, but in an opposite direction, and the unwinding movement ceases, when the pin 31 again assumes its initial position, the stoppage being positive and the sound-box and record being positively stopped at a pre-determined point. Machines of this class are ordinarily constructed so arranged as to traverse the sound-box from end to end of the record and then automatically return the sound-box to initial position to effect another reproduction or in a similar manner to effect the reproduction of a second record, which may be brought into proper position by suitable mechanism. In the present machine, where each record is subdivided so that it may contain a number of short speeches, verses, or the like, it is intended that the sound-box shall remain in the position to which it is moved at the completion of each reproduction, except at the reproduction of the last record on the cylinder, at which time there is set into operation a mechanism for restoring the sound-box to the usual starting-point. The stopping mechanism previously described therefore acts to stop both the rotation of the record and the movement of the sound-box while the stylus is still in contact with the record, and after the insertion of a second coin and a second winding movement the record again starts and the sound-box is again moved until the second reproduction is effected, and so on until the sound-box arrives at the end of the cylinder.

At the right-hand end of the machine, or at that end at which the winding-segment is placed, the winding-shaft is provided with a pin or tooth 40, which is moved into engagement with the teeth of a wheel 41, mounted on a suitable stud 42, the latter being moved to an extent depending on the rotative movement of the winding-shaft. The arms 8, which carry the trough 7, are pivoted, as before described, on studs 9, and one of said arms 8 is provided with a depending lug 43, which is engaged by a pin 44, carried by the toothed wheel 41 and serves to elevate the trough 7 after the sound-box has been restored to the starting-point. The arm 8 is further provided with a projecting tooth 47, engaged normally by a latch 48, pivoted on the stud 42 and serving to maintain the trough in elevated position and through said trough to hold the sound-box in contact with the record-cylinder and the half-nut of the box-carriage in engagement with the threaded shaft. The frame is provided with a pin 50, carrying two springs 51 and 52, the spring 51 being connected to the arm 8 and tending to depress the trough, while the spring 52 is connected to the latch 48 and tends to hold the latter in engagement with the tooth 47 of the arm 8.

To the upper portion of the frame is pivoted a bell-crank trip-lever 53, one arm of which projects within the path of movement of a

small bar 54 on the sound-box-carrying frame, while the opposite arm of said lever is adapted to come into engagement with the upper end of the latch 48 and move the same from engagement with the tooth 47 of the arm 8 at the time the sound-box arrives at the end of the record-cylinder. When the arm 8 is released from the catch 48, the spring 51 instantly depresses the trough 7 and by the shifting of the usual handle 6 raises the box from engagement with the record and moves the half-nut from contact with the threaded shaft 3, thus permitting the returning spring 55 to restore the sound-box carriage to the starting-point. The parts then remain in this position until the first winding of the spring, when the pin 46 on toothed wheel 41 comes into engagement with the depending lug 44 of lever 8 and again restores the trough 7 and the parts which it operates to initial position, the tooth 47 passing under the latch 48 and the spring 52 of said latch serving to hold the latch in locked position and the trough elevated during all of the similar reproductions in the length of the cylinder.

The mechanism thus far described is applicable for use in connection with single records, or where frequent change is desired it is preferred to employ the mechanism in connection with the plurality of sound-records which may be moved automatically into operable relation with the sound-box and the actuating mechanism of the machine. For this purpose there is employed a disk 60, mounted on a spindle 61, which at one end passes through suitable bearing-openings in a pair of parallel standards 62, arranged at a slight distance from the mandrel-shaft 2 of the machine. This shaft carries a plurality of auxiliary mandrel-shafts 63, having mandrels 64, on which may be placed suitable records. The opposite end of the shaft 61 rests in a bearing carried by a truss-frame 65, arranged near the right-hand end of the machine, and to this end of the shaft there is secured a plate 66 of a shape depending on the number of auxiliary mandrel-shafts, the plate in the present instance being shown as hexagonal in form and six auxiliary mandrel-shafts being employed. To each of the six sides of the disk is pivoted or hinged a plate 67, having a central opening 68 for the reception of the left-hand end of the mandrel-plate, the construction permitting of the ready movement of the shaft to open position when it is desired to substitute a fresh record for those carried by the mandrels.

The main actuating-shaft 2 is quite short and terminates in a clutch-face 70, adapted to interlock with a similar clutch-face 71, formed on each of the auxiliary mandrel-shafts 63 as the latter are successively brought into engagement therewith. Beyond the clutch-face the mandrel-shaft is provided with a small lip or flange 73, which serves to receive the end of the mandrel-shaft as the latter moves to

position and to guide the same into engagement with the clutch-face of the main shaft.

To the shaft 61 is secured one end of a coiled spring 74, the opposite end of said spring being secured to the fixed frame, and said spring is of sufficient strength to revolve the shaft, the disk 60, and all of the auxiliary mandrels when released. The shaft 61 is further provided with a helical compression-spring 75, which normally throws the shaft, the disk, and all of the mandrels toward the left-hand end of the machine, so that when free to operate this spring will act to keep an auxiliary mandrel-shaft in clutching engagement with the main mandrel-shaft, and the rotations to the latter will be imparted to the auxiliary shaft with which it is interlocked.

In order to release one of the auxiliary mandrel-shafts from engagement with the main actuating-shaft, it becomes necessary to contract the spring 75 and withdraw the shaft 61 and all of the auxiliary shafts toward the right of the machine, and for this purpose there is employed a lever 76, pivoted at one end to a stud 77, carried by the fixed frame, the opposite end of said lever being provided with an opening for the passage of the shaft 61 and being normally acted upon by the spring 75. At a point intermediate of the length of the lever 76 it is connected to that arm of the bell-crank lever 53 with which the sound-box carriage engages, so that on movement of the bell-crank lever the arm 76 will also be moved, and the shaft 61 and all of its supported parts will be moved toward the right, causing the disengagement of the reproduced record from the main actuating-shaft 2, the end of the auxiliary shaft passing beyond the end of the lip or flange 73 and permitting the spring 74 to revolve the shaft 61 and the disk 60 until a second mandrel-shaft comes into engagement with the lip 73.

In following the operation of the parts a coin is supposed to have been inserted and is resting on the lugs 19. The lever is then depressed, causing the interlocking of arm 17 with the segment through the intervening coin and effecting the winding up of the spring by the turning of the pinion 11 and winding-shaft 10. When pressure on the operating-lever is released, said lever is restored to its initial position by spring 20, and as the arm 17 comes in contact with pin 27 the pawl 22 is raised from engagement with ratchet-wheel 23 and the mechanism allowed to operate. This results in a partial movement of the sound-box, the movement being stopped at any predetermined point in the length of the cylinder by means of the pin 31 and the disk 33, and at the completion of this first reproduction the stylus remains in contact with the record. The operation is again repeated and continues time after time until the sound-box reaches the end of the record, at which time the bell-crank lever 53 will be moved to trip the latch

48, allowing the trough 7 to descend and the return-spring of the sound-box carriage to withdraw the sound-box to the starting-point. This movement is accomplished very quickly and does not interfere with the movement imparted to the lever 76. When this lever is moved, the shaft 61 and all of the parts supported thereby are moved toward the right-hand end of the machine, causing the disengagement of the clutch-faces of the main actuating and auxiliary mandrel-shafts and the movement of the previously-clutched mandrel-shaft from the tongue 73. At this time the spring 74 commences to operate and moves the disk 60 until a second auxiliary mandrel-shaft comes into contact with the lip or flange 73, stopping the movement of the shaft 61, the pressure on the releasing-arm 76 having been relieved as soon as the returning-spring of the sound-box carriage started its retractile movement. When a fresh coin is inserted, the first winding movement brings the pin 46 into engagement with the depending lug 44 and again restores the sound-box and its carriage into operable relation with the record-cylinder and the threaded shaft.

The construction of the multiple-record carrier may be somewhat altered, as illustrated in Figs. 11, 12, 13, and 14. The main spindle 61' has suitable bearings in standards 65', and near one end of the spindle is a wheel 80, on which is wound a cord or chain 81, passing up over a guiding-pulley 82 and provided at its lower end with a weight 83, that serves as a means for imparting intermittent rotative movement to the spindle 61'. This spindle carries two fixed heads or disks 84 and 85, in which are journaled record-carrying standards 86, one end of each of said standards being of the construction shown in Fig. 10 and hereinbefore referred to for the purpose of engaging the end of the actuating-shaft 2. Each standard 86 carries a fixed head 87 in the form of a flanged disk adapted to engage one end of a cylindrical record 88, that may be of any desired manufacture. The opposite end of the record 88 is supported by a flanged disk 89, slidably mounted on the standard 86, the hub of said disk being engaged by one end of a spring 90, coiled around the standard and having its opposite end bearing against a fixed collar 91, carried by said standard. This serves to press the disk 89 in the direction of the disk 87, and the record is firmly clamped, although it may be readily expanded or contracted when subjected to changes in diameter, or it may be readily removed from position when necessary, although it is not intended that these records shall be frequently renewed, inasmuch as the whole multiple record is taken from one machine and then carried to a second, while the multiple record of the second machine is removed and carried to a third, and so on, it being unnecessary to frequently renew the individual records. On one of the

supporting-standards is secured a spring 92, having its free end disposed in horizontal alinement with the axis of the shaft 2 and adapted to engage the outer ends of the record-carrying standards in order to more firmly hold the clutching-faces in contact with each other. The base of the machine is provided with a standard 94, forming a support for a bell-crank lever 95, having at one end a roller 96, disposed in the path of movement of the several flanged disks 87. The opposite arm of this bell-crank lever is bell-shaped and in cross-section, being provided with an inclined flange 97, that is disposed within the path of movement of a pin 98, secured to and movable with the adjusting-lever 7 of the sound-box. When the adjusting-lever is held down with the sound-box elevated, the pin 98 is projected, this occurring during the return movement of the carriage, and as such carriage is moved rearwardly under the influence of its retracting-spring the pin 98 will engage the cam-like flange 97 and depress the same, causing the roller 96 to force the disk 87, with which it is engaged, outward or in the direction of the disk 84, the extent of movement being such as to disengage the record-carrying standard from the shaft 2 and permit the counterweight 83 to turn the multiple carrier for a partial revolution. At about the time of the complete disengagement of the two clutch-faces 70 and 71 the pin has reached the end of the cam-shaped flange, and the latter immediately rises under the influence of a spring 99, causing the roller 96 to move from engagement with disk 87 and leaving a free passage for the next succeeding record-carrying mandrel and the latter being moved outward or in the direction of the shaft 2 by means of the spring 92 as it approaches clutching position. This operation is entirely automatic, and when the sound-box again descends into contact with the periphery of the record the pin is withdrawn, so that it cannot again engage the cam-shaped flange during the sound-reproducing movement, and it is only when the sound-box is in inoperative position that the pin is in operative position.

The device forming the subject of the present invention may be operated in many different ways, but has been principally described as used in connection with coin-controlled mechanism. As it is intended principally for advertising purposes, it may be used in connection with any movable object, such as a cash-register drawer or a cork-puller, or, as shown in Fig. 15, a beveled pinion 11' may be substituted for the pinion 11 and the pinion arranged to intermesh with a beveled segment 100, adapted to a vertical standard or held in a bracket 101 on the stationary frame on the jamb of the door. This segment is operatively connected to a door 102, so that on opening or closing movement of the door, as the case may be, the apparatus will be set

into motion and the incoming or outgoing customer greeted in suitable manner.

The device forming the subject of this invention may be employed in connection with phonographs or graphophones of any desired construction and may be employed to advantage for the reproduction of musical selections and the like in the usual manner, or it may be connected to a vending-machine or to any operative device, such as coffee-mill, a lever-corkscrew, or other mechanism where it may be desired to reproduce catch phrases or the like.

Having thus described the invention, what is claimed is—

1. In a device of the class specified, the combination with record supporting and revolving means, of a sound-box, a motor-shaft for traversing the sound-box, an actuating-spring connected to the shaft, an actuating-lever for winding the spring to store energy to an extent less than is sufficient to traverse the sound-box for the entire length of the record, means for stopping the record at predetermined intervals and for maintaining the stylus in engagement with the record until the whole of the latter has been reproduced, means for raising the sound-box to disengage the stylus at the completion of a reproduction, and means for restoring the sound-box to its initial position.

2. In a device of the class specified, the combination with a record-carrier and a sound-box, of a motor mechanism for actuating the same, a motor-winding shaft, a disk disposed on the shaft, a pin carried by the disk, and a stop-disk having teeth for a portion only of its periphery and serving by engagement of the pin therewith to stop both the winding and actuating movements of the motor.

3. In a device of the class specified, the combination with a record-carrier and a sound-box, of a motor mechanism for actuating the same, means for stopping the actuating movement of the motor at predetermined intervals, a bar for moving the sound-box to inoperative position, a pivoted arm carrying said bar and provided with a depending lug, a latch adapted to engage said arm thereby to maintain the bar in elevated position, a toothed wheel, a pin carried thereby for engagement with the lug, a winding-shaft having a tooth or lug engaging said wheel, and a bell-crank lever movable to latch-disengaging position by contact with the sound-box carriage at the completion of the reproduction of an entire record.

4. In mechanism of the class described, the combination with a sound-box, of a multiple-record carrier including a pair of spaced disks, record-carrying mandrels, mandrel-shafts projecting through both of the disks and having longitudinal movement independent of said disks, one end of each shaft having a clutch-face for engagement with an actuating-shaft, and a spring for consecutively engaging the

opposite ends of the shafts and forcing the same in the direction of the actuating-shaft.

5 In a mechanism of the class described, a multiple-record carrier, a sound-box, means
for moving the sound-box during the repro-
ducing and the return movement, a sound-box
carrier, a pin supported thereby and movable
to operative and inoperative positions by mov-
ing of the sound-box, a pivotally-mounted arm
10 for engaging the record-carrier, and a cam
connected to the arm and engaged by said pin.

6 In a device of the class specified, the com-
bination with a mandrel-actuating shaft and
means for revolving the same, of a plurality
15 of record-carrying mandrels, auxiliary shafts
carrying said mandrels having longitudinal
movement independently of the same, means
for moving the auxiliary shafts into alinement
with the mandrel-actuating shaft, and means
20 for clutching the auxiliary shafts to the actu-
ating-shaft.

7 In a device of the class specified, a man-
drel-actuating shaft and means for revolving
the same, a plurality of record-carrying man-
drels, auxiliary mandrel-shafts having longi-
tudinal movement independently of the man-
drels and each having a clutch-face and adapted
to engage with a similar clutch-face on the
end of the actuating-shaft, and means for suc-
cessively moving the auxiliary shafts into op-
erative relation with the actuating-shaft.

8 In a device of the class specified, a man-
drel-actuating shaft and means for rotating the
same, a plurality of auxiliary mandrel-carry-
ing shafts, a revoluble carrier therefor, said
carrier being longitudinally adjustable, clutch-
ing-faces formed on all of the shafts, means
for automatically disengaging the auxiliary
shaft from the actuating-shaft after the re-
production of the record carried by said aux-
iliary shaft, means for revolving the carrier
to move a second auxiliary shaft into aline-
ment with the actuating-shaft, and means for
moving the auxiliary shaft in the direction of
45 the actuating-shaft without corresponding
movement of the mandrels and carrier.

9 In mechanism of the class described, the
combination with a mandrel-actuating shaft
and means for revolving the same, said shaft
50 being provided with a clutch-face and having
a projecting lip or flange beyond the clutch-
face, a plurality of auxiliary mandrel-carry-
ing shafts each having an end clutch-face, and
being movable independently of its mandrel,
55 a carrier for all of the auxiliary shafts, a shaft

on which the carrier is supported, a spring
acting on said carrier-shaft and normally tend-
ing to force the carrier and all of the auxiliary
shafts in the direction of the clutching-face
of the actuating-shaft, a trip-lever with which
60 the sound-box comes into contact at the com-
pletion of a reproducing movement, said le-
ver serving to move the carrier in a direction
away from the actuating-machine, and a
spring connected to the carrying-shaft for im-
parting rotative movement thereto and to the
carrier.

10 In mechanism of the class described, the
combination with a mandrel-actuating shaft
having a clutch-face and provided with a pro-
jecting lip or flange, of a sound-box, means for
returning the sound-box to initial position at
the completion of a reproducing movement,
a plurality of auxiliary record-carrying shafts
each having a clutch-face, a revoluble carrier
75 for said auxiliary shafts, said carrier com-
prising a main shaft, a disk supported on the
shaft and to which one end of each of the
auxiliary shafts is secured, a plate disposed
near the opposite end of said main shaft, and
80 a plurality of pivoted members carried by
said plate and provided each with an opening
for the reception of the end of one of the aux-
iliary shafts.

11 In mechanism of the class described, the
combination with a mandrel-actuating shaft
having a clutch-face, of a sound-box-operat-
ing means, mechanism for returning the
sound-box to the starting-point after each re-
producing movement, a plurality of auxiliary
90 mandrel-carrying shafts each having a clutch-
face, a revoluble carrier for all of the auxil-
iary shafts, a shaft supporting the carrier, a
spring for forcing the carrier in the direction
of the actuating-shaft, a pair of levers pivoted
95 near one end of the frame and to each other,
one of said levers being connected to the car-
rier-shaft, a sound-box-disengaging bar, a
latch for supporting the bar and operated by
the second of the pivoted levers, both of said
100 levers being engaged by the sound-box car-
riage at the completion of a reproducing move-
ment, substantially as specified.

In testimony that I claim the foregoing as
my own I have hereto affixed my signature in
105 the presence of two witnesses.

THOMAS F. SOLON.

Witnesses:

CHAS. A. KEELER,
MARY T. VIZARD.

761,371

No. 761,371.

PATENTED MAY 31, 1904.

E. GILBERT.
ATTACHMENT FOR PHONOGRAPHS.

APPLICATION FILED MAR. 23, 1903.

NO MODEL.

FIG. 1

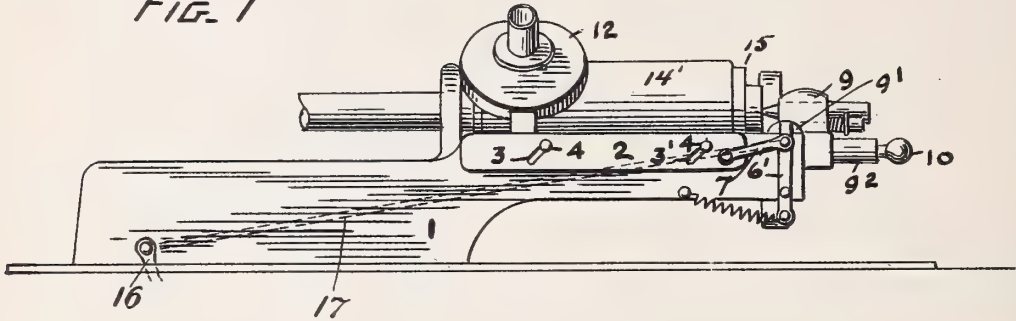


FIG. 2

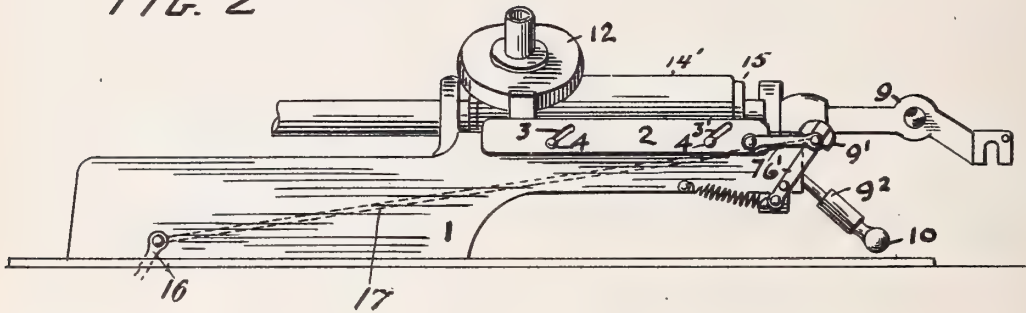


FIG. 3

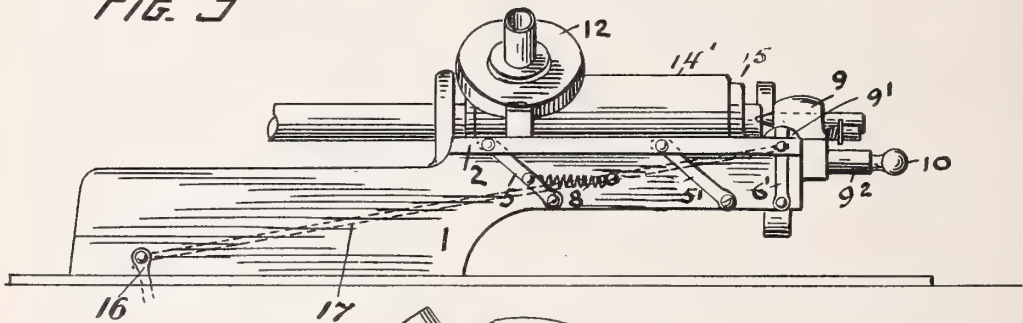
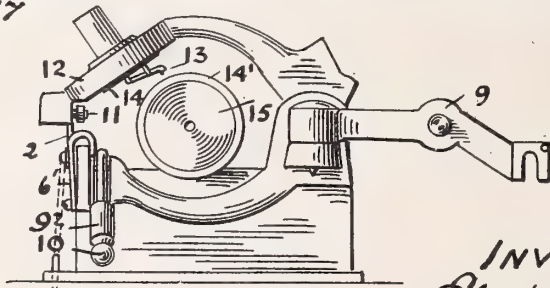


FIG. 4



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UNITED STATES PATENT OFFICE.

ELAM GILBERT, OF PORTLAND, OREGON.

ATTACHMENT FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 761,371, dated May 31, 1904.

Application filed March 23, 1903. Serial No. 149,023. (No model.)

To all whom it may concern:

Be it known that I, ELAM GILBERT, a citizen of the United States, residing at Portland, county of Multnomah, State of Oregon, have
 5 invented certain new and useful Improvements in Attachments for Phonographs; and I do hereby declare the following to be a full, clear, and exact description of the same.

The present invention relates to means
 10 whereby the reproducer-head of the phonograph or graphophone is automatically raised with the stopping of the machine in order to lift the needle or point of the diaphragm clear of or out of contact with the record or
 15 to lower the said reproducer-head to place the needle or point of the diaphragm in contact with the record on the starting of the machine, the object of the invention being to provide against scratching or mutilation of
 20 the record during its removal from the mandrel of the machine, to expedite the work of changing the record, and to provide against the stopping and starting of the machine without automatically moving the reproducing mechanism from and toward the record.

To comprehend the invention, reference should be had to the accompanying sheet of drawings, wherein—

Figure 1 is a front view of a phonograph
 30 with the attachment applied thereto, the lock-gate being closed and the slide-plate for operating the reproducer-head being lowered. Fig. 2 is a similar view disclosing the lock-gate open and the slide-plate in its elevated
 35 position. Fig. 3 is a view similar to that illustrated by Fig. 1 of the drawings, disclosing a modification as to the form of connection between the slide-plate and the face of the frame of the phonograph; and Fig. 4 is
 40 an end view of the mechanism disclosed by Fig. 2 of the drawings.

To the face of the phonograph frame or bed 1 is secured the longitudinally-movable slide-plate 2, which may be attached thereto in various ways. In the drawings two ways of slidably uniting the slide plate or bar 2 are illustrated. The simplest form consists in providing the slide-plate with two inclined vertical slots 3 3', through which extend the pins or

screws 4, which are fastened to the frame 1. As
 50 thus secured the slide plate or bar 2 as moved outward and inward longitudinally rides upon the projecting pins, studs, or screws 4 and is raised and lowered at an inclination to the face of the frame 1, so as to cause the same to move
 55 above the edge of the said frame or to lower the same in line therewith. This form of connection is set forth in Fig. 1 of the drawings. In Fig. 3 the slide-plate 2 is illustrated as being united to the face of the frame 1 by
 60 means of the inclined arms 5 5', which arms are pivoted at their lower end to the frame 1 and at their upper end to the said slide-plate 2.

The slide-plate 2 is connected to a lever 6', pivoted to the frame 1 by means of the connecting-plate 7. In Fig. 1 of the drawings the lever 6' is illustrated as being attached at its lower end to the frame 1 by means of the spring 7', while in Fig. 3 of the drawings a spring connection 8 is made between the arm
 70 5 and the frame 1. The tension of the spring connection tends to hold the slide-plate moved outward the moment the said plate is released to raise the slide-plate above the edge of the frame 1.

The slide-plate is forced inward and lowered by means of the lock-gate 9, which is hinged to the rear end of the frame 1. The free end of this lock-gate as the same is swung inward bears against the upper portion or
 80 head 9' of the lever 6' and forces the same inward, the movement of which through its connection throws the slide-plate 2 in a corresponding direction. The connection between the said slide-lever and the frame 1 is
 85 such that as thrown inward the same is moved downward at an inclination to the face of the frame 1 until its upper edge is approximately flush with edge of the said frame.

The lock-gate 9 is held in locked position by means of the latch 9², hinged to the frame 1. The head 10 of this latch engages with the free end of the lock-gate when the same is closed. The moment the latch 9² is released and the lock-gate 9 swung outward the slide-plate 2 by
 90 reason of its spring connection is moved outwardly at an upward inclination to the face of the frame 1, so that the upper edge thereof is

carried or raised above the edge of the frame 1, Fig. 2 of the drawings.

Upon the upper edge of the slide-plate 2 rests the traveler or supporting-wheel 11 for the outer end of the reproducer-head 12, which carries the needle or point 13 of the diaphragm 14 of the reproducer. This needle or point traverses the wave-cuts within the face of the record 14', fitted upon the mandrel 15.

Connection is made between the lever 6' and the controlling brake-lever 16, which throws into and out of operation the drive mechanism (not shown) for the phonograph by means of the rod 17. As thus connected the said brake-lever 16 is actuated with the inward and outward movement of the lever 6', due to the locking and releasing of the lock-gate 9.

When withdrawing an old record or placing a new record upon the mandrel, it is required to raise the reproducer-head in order that the needle 13 will not scratch or mutilate the surface of the record as the same is slipped on or off of the mandrel. To remove or replace a record, the lock-gate must be fully opened. As at present constructed it is required that the reproducer-head be raised by hand either before or after the opening of the lock-gate and to lower the same to place the reproducer needle or point onto the surface of the record after the closing of the lock-gate.

By the before-described invention the reproducer-head is automatically raised and lowered, so that the reproducer point or needle will clear the surface of the record and be placed thereon with the opening and closing of the lock-gate.

As the slide-plate is raised and lowered it carries therewith the reproducer-head. By the described means for automatically raising and lowering the reproducer-head the operator is relieved of the necessity of handling this portion of the phonograph with the opening and closing of the lock-gate.

Having thus described the invention, what

is claimed as new, and desired to be protected by Letters Patent, is—

1. In a machine of the described character, the combination with the frame thereof, of the lock-gate hinged thereto, of the sound-reproducing mechanism, of means actuated by the opening and closing of the lock-gate whereby the reproducing mechanism is automatically raised and lowered for the described purpose.

2. In a machine of the described character, the combination with the frame thereof, of an end lock-gate hinged thereto, the sound-reproducing mechanism, a vertically and longitudinally movable support for the reproducing mechanism, and devices for operating the said support to raise and lower the reproducing mechanism with the opening and closing respectively of the hinged end lock-gate.

3. The combination with the frame of a phonograph, of a longitudinally-movable slide-plate connected thereto, a reproducer-head supported thereby, a lock-gate hinged to the said frame, and connections whereby the closing and opening of the lock-gate actuates the slide-plate to lower and raise the reproducer-head to move the diaphragm point or needle toward and from the record-cylinder of the phonograph.

4. In a phonograph, the combination with the frame thereof, of an end lock-gate hinged thereto, the sound-reproducing mechanism, a vertically-movable supporting device for the head of the reproducing mechanism, and devices actuated with the opening and closing of the lock-gate for raising and lowering the supporting device to move the reproducing mechanism away from and toward the record of the machine.

In witness whereof I have hereunto set my hand.

ELAM GILBERT.

Witnesses:

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GEO. W. DAVIES.

761.705

No. 761,705.

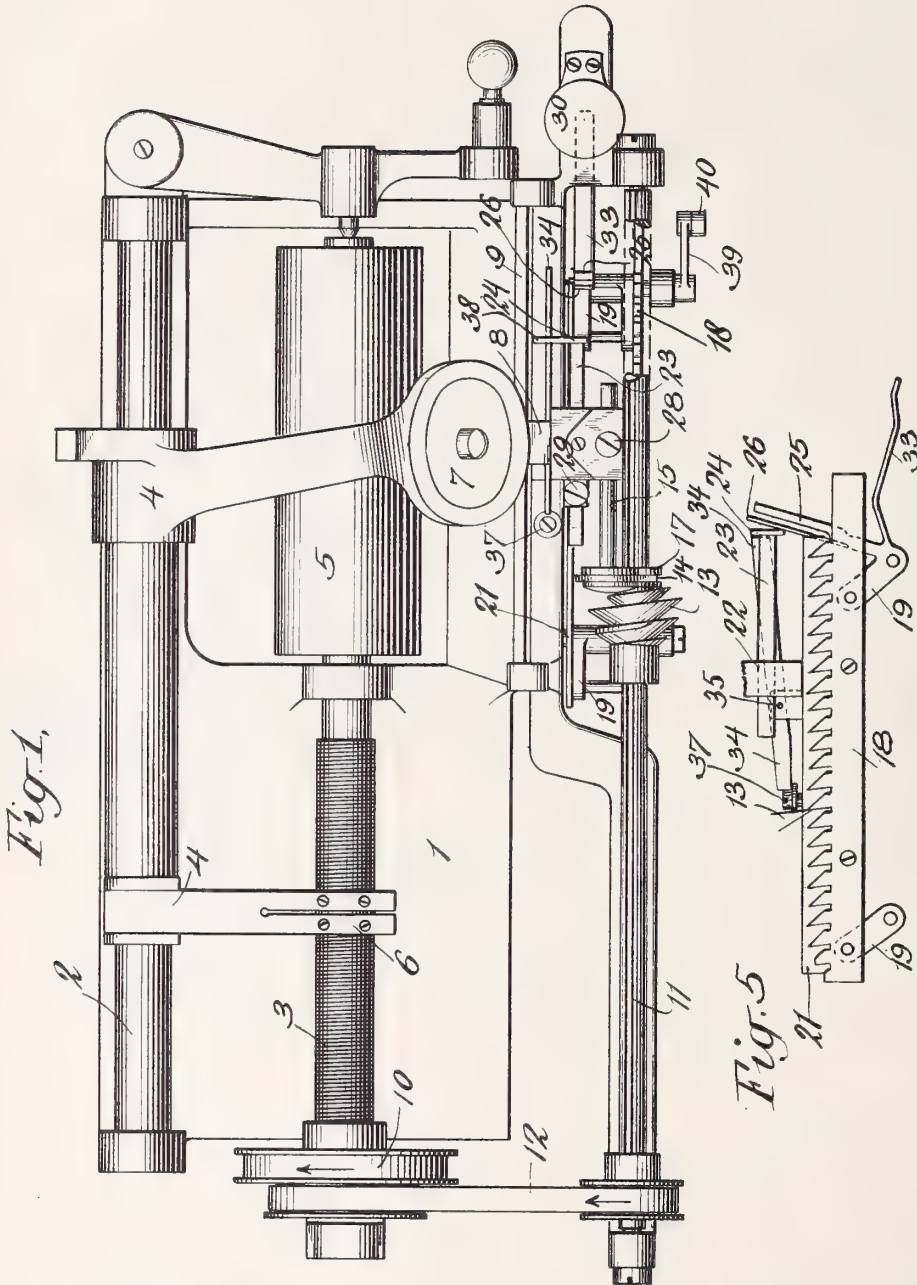
PATENTED JUNE 7, 1904.

F. PEARCE.
PHONOGRAPH OPERATING MECHANISM.

APPLICATION FILED MAR. 14, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



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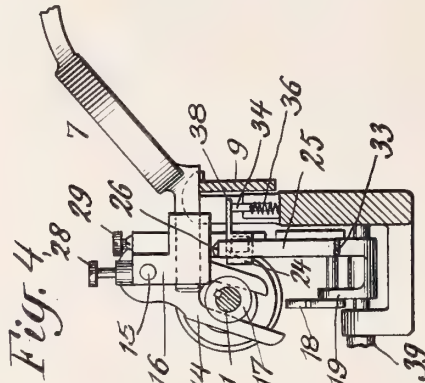
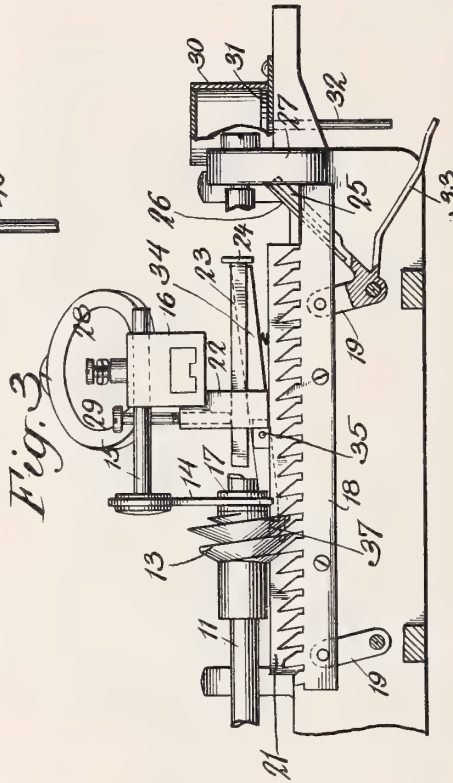
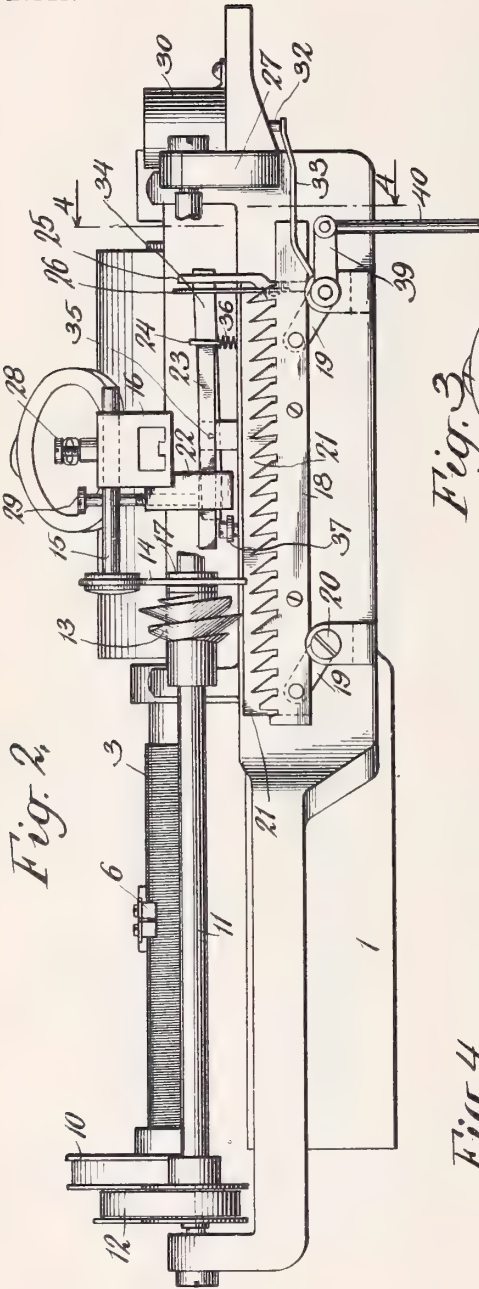
PATENTED JUNE 7, 1904.

F. PEARCE.
PHONOGRAPH OPERATING MECHANISM.

APPLICATION FILED MAR. 14, 1904.

NO MODEL.

3 SHEETS—SHEET 2.



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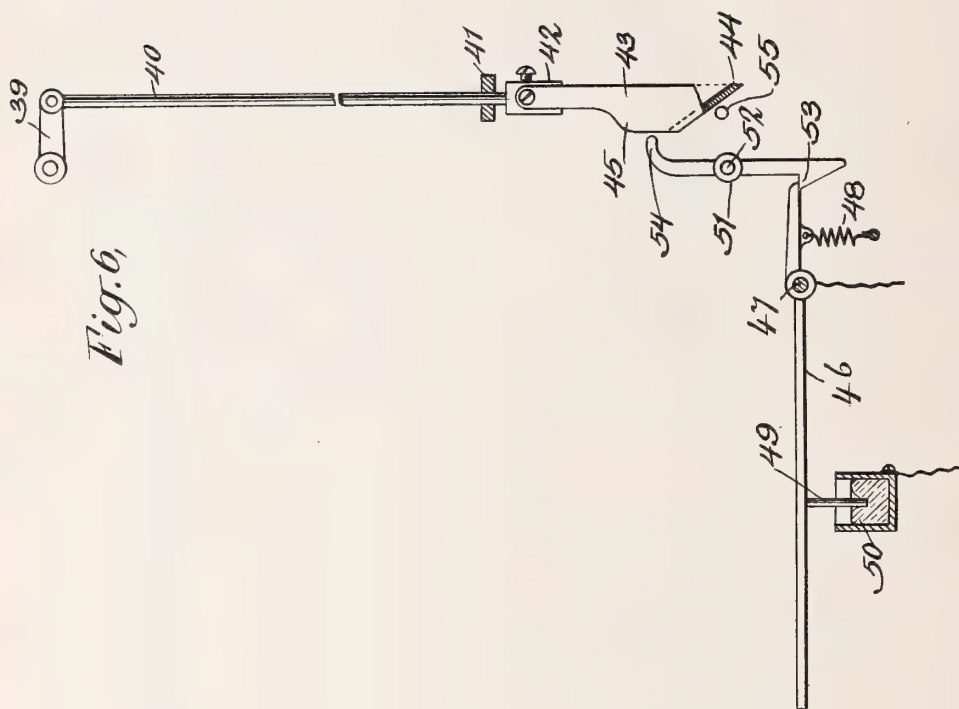
PATENTED JUNE 7, 1904.

F. PEARCE.
PHONOGRAPH OPERATING MECHANISM.

APPLICATION FILED MAR. 14, 1904.

NO MODEL.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FREDERICK PEARCE, OF NEW YORK, N. Y.

PHONOGRAPH-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 761,705, dated June 7, 1904.

Application filed March 14, 1904. Serial No. 198,034. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK PEARCE, a citizen of the United States of America, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improvements in Phonograph-Operating Mechanisms, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to phonograph-operating mechanism, and particularly to return mechanism therefor.

My invention comprises a worm and rack automatically operated to engage each other at a predetermined point in the forward movement of the phonograph-carriage, the worm rotated by suitable driving connections and connected to said carriage, so as to impart thereto a quick return movement, means being provided for disconnecting the carriage from direct driving engagement with its drive-shaft at the time of the operative engagement of the worm and rack with each other.

My invention also consists in certain improved means for adjusting the point at which the carriage commences its return movement and for adjusting the point at which the carriage completes its return movement, in an improved means for opening an electric circuit upon the completion of the carriage return movement, and in certain novel details of construction and combination of parts, as will hereinafter be fully pointed out.

I will now proceed to describe a machine embodying my invention with reference to the accompanying drawings and will then point out the novel features in claims.

In the drawings, Figure 1 is a top view of a machine embodying my invention. Fig. 2 is a front view of the same. Fig. 3 is a partial front view and a view partially in vertical section of certain portions of the return mechanism, showing the parts in the position they occupy when operating to return the carriage. Fig. 4 is a vertical transverse section, substantially upon the plane of the line 4-4 of Fig. 2, of the carriage-return mechanism. Fig. 5 is a detail view showing certain parts of the carriage-return mechanism in the positions they occupy just prior to the com-

mencement of the return movement of the carriage. Fig. 6 is a detail view of the circuit-controlling means.

The phonograph herein illustrated comprises the usual frame and bed 1, rear guide-rod 2, revolving feed-screw 3, and carriage 4. The screw-shaft carries the cylinder 5 for supporting the phonograph-records, and the carriage 4 carries the open-sided feed-nut 6, which engages the feed-screw 3, and a recording or receiving member 7. The carriage is supported at the rear upon the rear guide-rod 2 and slides freely thereon and is supported in front by a horn 8, which rests upon the front guide-bar 9. The feed-screw shaft is revolved continuously in one direction by means of a belt connection with a pulley 10 from a suitable electric or other motor. (Not shown.)

It is the purpose of the present invention to provide an improved means for lifting the carriage free from engagement with the feed-screw after the rendering of a record has been completed and for quickly returning the carriage to its initial position ready for again rendering the record when desired.

For the above purpose I provide an auxiliary shaft 11 suitably mounted to rotate in bearings upon the frame or bed 1 and connect the said shaft to rotate with the feed-screw shaft by belt-and-pulley connections 12. A worm 13 is rotatably mounted upon the shaft 11, but has a splined connection therewith, whereby relative longitudinal movement is freely permitted. The worm is connected to the carriage by means of a swinging arm 14, pivoted to a rod 15, adjustably secured to a block 16, rigidly fastened to the horn 8 of the carriage, which yoke has a forked end engaging the grooves, hub, or collar 17 of the worm. The said worm therefore partakes of the longitudinal movements of the carriage and of the rotary movements of the auxiliary shaft.

A swinging rack 18 is mounted beneath the worm 13 and auxiliary shaft 11, said rack pivoted to links 19 in turn pivoted at 20 to the said frame or bed 1 or a part secured thereto. The link connections 19 impart to the rack 18 a parallel swinging movement toward and away from the shaft 11. In Fig. 2 the rack is

shown in its lowermost position, in which position its teeth are out of the path of movement of the worm 13. In Fig. 3 the rack is shown as swung to its uppermost position, in which position its teeth engage the worm 13, as clearly shown. The said rack 18 carries at the rear thereof a plate 21, which is arranged directly beneath an extension 22 of the block 16, carried by the carriage. In the lowermost position of the rack the top of the plate 21 is out of contact with the said extension 22; but as the rack 18 swings upward the top of the said plate 21 engages the under side of the said extension 22 and upon completing its movement lifts the front end of the carriage a sufficient distance to cause the feed-nut 6 to disengage the feed-screw 3. When in this position, the front of the carriage is supported by the plate 21 in lieu of the guide-bar 9 and may slide freely thereon free from control of the feed-screw.

The rack 18 is operated to lift it into engagement with the worm 13 by means of a tripping-bar 23, adjustably secured to and carried by the carriage, being slidably mounted in the extension 22 of the block 16, said tripping-bar having an end piece 24, which engages a rocker-arm 25, secured to one of the links 19. The rocker-arm is preferably provided with a spring-tongue 26, which acts as a buffer between the end piece 24 and the rocker-arm 25.

The operation is as follows: A suitable connection with the belt-wheel 10 from a source of power (not shown) imparts rotary movement to the feed-screw shaft and by means of the engagement of the feed-nuts 6, secured to the carriage, a longitudinal movement from left to right of the carriage. Rotary movement is simultaneously imparted to the auxiliary shaft 11 by reason of the belt connection 12, rotary motion being thereby imparted to the worm 13, the worm 13 being simultaneously moved along the auxiliary shaft 11 by means of its connection through the lever 14 and rod 15 with the carriage. In the movement of the carriage the end piece 24 of the tripping-bar 23 gradually approaches the rocker-arm 25, and movement of the carriage continues until the rocker-arm 25 is forced over by the tripping-bar 23 to lift the rack 18. As the rack 18 is lifted the plate 21 engages the under side of the extension 22 of the block 16 and lifts the front of the carriage, so as to disengage the feed-nut 6 from the feed-screw 3. This lifting movement in no way affects the connection between the worm 13 and the carriage 4, because the forked end of the lever 14 permits considerable sliding movement of the lever, while still maintaining its engagement with the collar 17. The lifting of the rack causes the teeth thereof to engage the worm 13. The pitch of the worm 13 is very much greater than is the pitch of the feed-screw 3, so that any movement caused by engagement

of the worm 13 with the rack 18 will be very much faster than a movement caused by engagement of the feed-nut 6 with the feed-screw 3. The first effect of the engagement of the worm 13 with the teeth of the rack 18 will be to rapidly complete the swinging movement of the rack 18, swinging the said rack over as far to the right as it will go. The end of the rack 18 engages the bracket 27 and forms a stop, preventing excess of movement of the rack 8 beyond that which is desired. The parts are shown in this position in Fig. 3 of the drawings. When the rack can move no farther, the worm 13 will wind itself along the teeth of the rack, so as to slide upon its shaft rapidly to the left. In so sliding it will carry with it the carriage, which at this time will be free from control by its feed-screw 3. The engagement of the extension 22 with the plate 21 is such as to permit free sliding movement of the carriage while preventing it from dropping. The carriage will be moved over to the left until the worm winds itself clear of the teeth of the rack at the left-hand end thereof, when the rack will then be free to drop back to its normal position, in which position it is shown in Fig. 2. In dropping back to its normal position the plate 21 will be freed from the extension 22 and the carriage will be allowed to drop down, so that the feed-nut 6 will again engage the thrust of the feed-screw 3. The carriage will now be free to be carried over to the right again for another cycle of operations, as above described. The starting position of the carriage may be adjusted by means of the lengthwise adjustment permitted to the rod 15, a screw 28 being provided for locking the rod 15 in the position to which it may be adjusted. Similarly the point at which the carriage commences its return movement may be adjusted by means of the lengthwise adjustment permitted to the tripping-bar 23, an adjusting-screw 29 being provided for locking the bar in the position to which it may have been adjusted.

In order to prevent too rapid a return movement of the rack 18 and to prevent jar upon the parts, I have provided an air-check comprising a cylinder 30, having mounted therein a piston 31, whose piston-rod 32 is in the path of movement of an arm 33, secured to the rocker-arm 25 and link 19. In the downward movement of the rack 18, and hence upward movement of the arm 33, the said arm engages the piston-rod 32 and forces the piston 31 upward. The piston 31 is made to fit somewhat loosely in the cylinder 30, so that the air contained in the said cylinder will pass from one side of the piston to the other as the said piston moves. The fit of the piston employed is close enough to cause this movement to take place somewhat slowly, and hence the return movement of the rack 18 will be retarded.

In order to inforce complete upward movement of the rack 18 prior to the commencement of the return movement of the carriage, I have provided a swinging detent 34, pivoted at 35 to the frame of the machine or a part secured thereto, which detent is spring-actuated in one direction by means of a spring 36 and limited in its movement in such direction by means of an adjustable stop 37. The end piece 24 is provided with a rearwardly-extending finger 38, (see particularly Fig. 4,) which passes over the top of the detent 34 when the carriage is moving to the right, as clearly shown in Fig. 2. The finger 38, however, engages the top of the detent 34 and forces it downward against its spring tension until, finally, just after the end piece 24 engages the spring-tongue 26 of the rocker-arm 25 it passes beyond the end of the detent 34, and the detent 34 moves upward behind the finger 38 so far as the stop 37 will allow it. The parts are shown in this position in detail, Fig. 5, and when in this position the engagement of the end of the detent 34 with the rear side of the finger 38 will prevent the carriage from moving to the left until upon the completion of the swinging movement of the rack 18 the carriage will have been lifted as far as is desired, at which time the under side of the finger 38 will have been just lifted clear of the end of the detent 34. The carriage will then be free to travel to the left, as above described. In Fig. 3 the parts are shown with the carriage just lifted to such a position as to cause the finger 38 to clear the top of the detent 34.

The preferred form of motor for operating the machine is an electric motor, and it is desirable that there shall be means provided for breaking circuit, so as to cut out the electric motor upon the completion of the return movement of the carriage. Circuit may be closed in any desired manner, the means for this purpose forming no part of my present invention. In order to break the electrical circuit at the end of the return movement of the carriage, I preferably employ the movement of the rack, as thereby I leave the carriage entirely free of the electrical control, as is desirable, and insure proper return of all the parts to their normal positions before stopping the motor. I connect an arm 39 with one of the links 19 of the rack 18, (see Figs. 1 and 2,) so that the said arm will partake of the movements of said link and the rack-bar. To the end of the arm 39 I pivotally connect a connecting-rod 40. This connecting-rod may be of any length desired, as preferably the electrical control will be at some distance from the phonograph. In Fig. 2 I have shown the said connecting-rod broken away, and at Fig. 6 I have shown the lower end of the said connecting-rod, which passes through a suitable guide 41 and carries a block 42, to which is loosely pivoted a swinging cam-piece 43. The swinging cam-piece is pro-

vided with a rearwardly-extending toe 44 and an operating cam-surface 45. A switch-lever 46 is pivoted upon a stationary stud 47, said switch-lever spring actuated by a spring 48. The switch-lever 46 carries a contact-piece 49, which may conveniently be a plunger arranged to enter a mercury-cup 50. A detent 51, pivoted upon a stationary stud 52, is provided with a hooked portion 53, adapted to engage the end of the switch-lever 46 and to maintain the plunger 49 in contact with the mercury in the cup 50. The upper end of the detent 51 is provided with a projecting portion 54, arranged to be engaged by the cam-surface of the swinging cam-piece 43. The parts are in the positions in which they are shown in Fig. 6 when circuit is closed and the machine is operating with the carriage moving from left to right under the influence of the feed-screw 3. When the rack-bar swings upward to cause the commencement of the return movement of the carriage, the arm 39 will move downward, allowing the swinging cam-piece 33 to move downward. During such movement the lower face of the toe 44 will engage a stationary stud 55 and will be swung outwardly until finally at its lowermost position the surface of the said toe will have passed the stud 55, and the cam-piece will again swing back into position, but with the stud in the path of the upward movement of the upper surface of the toe 44. The parts will rest in this position until at the completion of the return movement of the carriage the rack again falls, lifting the lever 39 and lifting the swinging cam-piece 43. The stud 55 now engaging the upper surface of the toe 44, the swinging cam-piece will be swung to the left, causing the cam-surface 45 to engage the projecting portion 54 of the detent 51, swinging the same upon its pivotal support 52 and releasing the hook 53 thereof from engagement with the switch-lever 46. The switch-lever 46 will now rock upon its support, under influence of the spring 48, to lift the plunger 49 clear of the mercury-cup 50, and electrical connection through the said mercury-cup will be broken. The parts will now remain in this position until the switch-lever 46 is reset. The switch-lever 46 may be reset by hand or by coin-controlled mechanism or in any manner desired.

It will be obvious that the foregoing is but one embodiment of my invention and that the same is capable of many and varied modifications within the spirit and scope of my invention, and, further, that certain parts may be employed in connection with other parts of different construction. Hence I do not desire to be limited only to the precise details of construction and combination of parts herein.

What I claim is—

1. In phonograph-operating mechanism, the combination with a threaded drive-shaft and

a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move longitudinally with the carriage, and a rack with which said worm is adapted to engage, said rack and worm arranged to move laterally into and out of engagement with each other, and means disconnecting said carriage from direct engagement with said drive-shaft upon operative engagement of said worm and rack.

2. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move longitudinally with the carriage, a rack with which said worm is adapted to engage, and means for moving said rack and worm laterally with respect to each other to engage and disengage each other, and for simultaneously lifting the carriage upon a movement engaging said rack and worm to disconnect the carriage from engagement with the said threaded drive-shaft.

3. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, said worm connected to said carriage, a rack arranged to move into and out of connection with said worm, and means operated by said rack in its movement in one direction, disconnecting said carriage from direct engagement with said threaded drive-shaft.

4. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft rotatably connected with said drive-shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, means connecting said worm to move longitudinally with said carriage, a rack arranged longitudinally in line with said worm, links pivotally supporting said rack and themselves pivoted to a stationary support, a member carried by said rack adapted to engage the said carriage and lift same to disconnect it from direct engagement with the threaded drive-shaft, and means for swinging the rack upon its support to throw same into and out of engagement with the said worm.

5. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, said worm connected to said carriage, a rack mount-

ed longitudinally in line with the plane of movement of the worm, links pivotally supporting said rack and themselves pivoted to a stationary support, carriage-lifting means controlled by said rack, and tripping means for operating said rack, controlled by longitudinal movements of the said carriage.

6. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move longitudinally with the carriage, a rack with which said worm is adapted to engage, means for moving said rack and worm laterally with respect to each other to cause same to engage or disengage each other, means disconnecting the carriage from direct engagement with said threaded drive-shaft upon operative engagement of said worm and rack, and means temporarily locking the carriage against return movement during the relative lateral movement of the rack and worm to engage each other.

7. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft rotatably connected with said drive-shaft, a worm rotatably mounted upon drive-shaft, but arranged to slide longitudinally thereon, means connecting said worm to move longitudinally with said carriage, a rack arranged longitudinally in line with said worm, links pivotally supporting said rack and themselves pivoted to a stationary support, a member carried by said rack adapted to engage the said carriage and lift same to disconnect it from direct engagement with the threaded drive-shaft, means carried by the carriage for engaging the rack to swing it upon its support into engagement with the worm, and means for temporarily locking the carriage against return movement during the movement of said rack to engage said worm.

8. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move longitudinally with the carriage, means for manual adjustment of the position of the worm with respect to the carriage, and a rack with which said worm is adapted to engage, said rack and worm arranged to move laterally into and out of engagement with each other, and means disconnecting said carriage from direct engagement with said drive-shaft upon operative engagement of said worm and rack.

9. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move

longitudinally with the carriage, and a rack with which said worm is adapted to engage, means controlled by movement of the carriage for causing the rack and worm to move laterally with respect to each other to engage or disengage each other, said means manually adjustable with respect to said carriage whereby the limit of travel of the carriage in either direction may be predetermined, and means for disconnecting said carriage from direct engagement with said drive-shaft upon operative engagement with said worm and rack.

10 In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft rotatably connected with said drive-shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, means connecting said worm to move longitudinally with said carriage, said means adjustable longitudinally with respect to said carriage, a rack arranged longitudinally in line with said worm, links pivotally supporting said rack and themselves pivoted to a stationary support, a member carried by said rack adapted to engage the said carriage and lift same to disconnect it from direct engagement with the threaded drive-shaft, a tripping-bar secured to said carriage for engaging said rack and swinging it upon its support to throw same into engagement with said worm, said tripping-bar adjustable longitudinally with respect to said carriage.

11. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, said worm connected to said carriage, a rack arranged to move into and out of connection with said worm, an air-check opposing the return movement of said rack, and means operated by said rack in its movement in one direction, disconnecting said carriage from direct engagement with said threaded drive-shaft.

12. In phonograph-operating mechanism, the combination with a threaded drive-shaft

and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising a worm connected to move longitudinally with the carriage, and a rack with which said worm is adapted to engage, said rack and worm arranged to move laterally into and out of engagement with each other, means disconnecting said carriage from direct engagement with said drive-shaft upon operative engagement of said worm and rack, and means for opening an electric connection upon relative movement of said rack and worm to disengage each other.

13. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, said worm connected to said carriage, a rack arranged to move into and out of connection with said worm, means operated by said rack in its movement in one direction, disconnecting said carriage from direct engagement with said threaded drive-shaft, and means operated by said rack in its movement in the other direction for disconnecting electrical contacts.

14. In phonograph-operating mechanism, the combination with a threaded drive-shaft and a carriage deriving motion in one direction therefrom, of return mechanism for the carriage comprising an auxiliary shaft, a worm rotatably mounted upon said shaft but arranged to slide longitudinally thereon, said worm connected to said carriage, a rack arranged to move into and out of connection with said worm, means operated by said rack in its movement in one direction, disconnecting said carriage from direct engagement with said threaded drive-shaft, means operated by said rack in its movement in the other direction for disconnecting electrical contacts, and an air-check opposing movement of the rack in the latter direction.

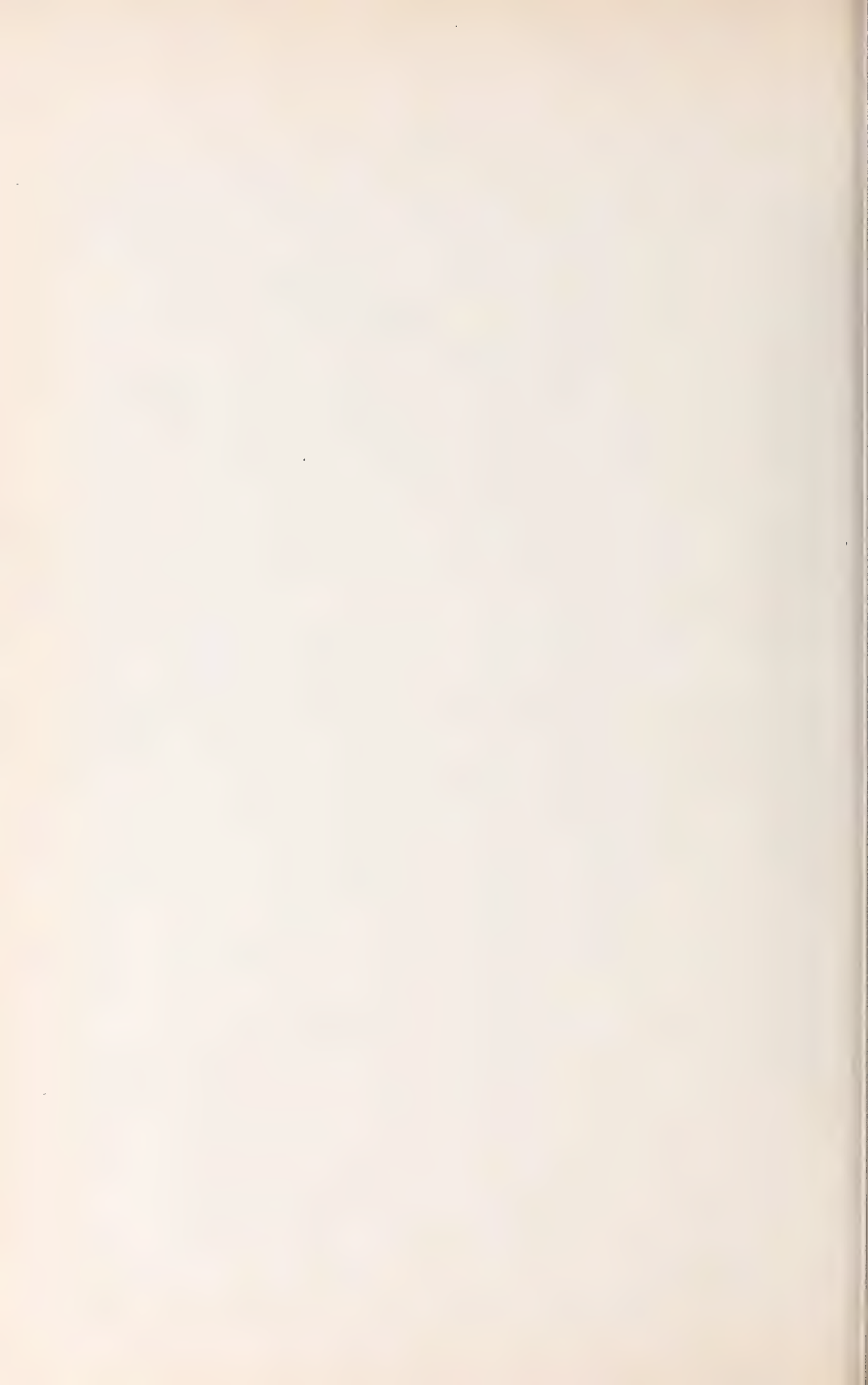
In witness whereof I have hereunto set my hand this 10th day of March, 1904.

FREDERICK PEARCE.

Witnesses:

C. F. CARRINGTON.

C. L. HALL.



No. 761,729.

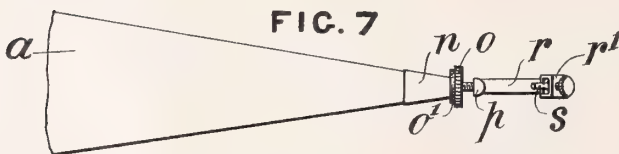
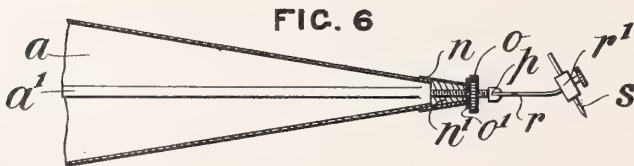
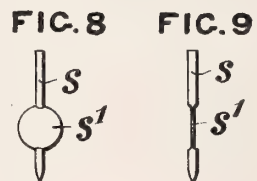
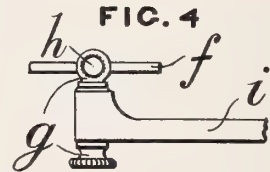
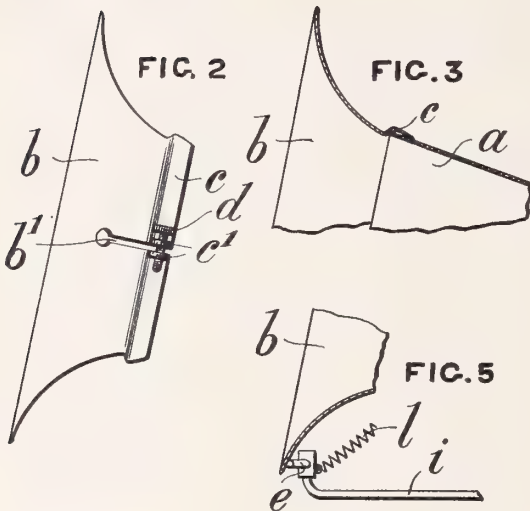
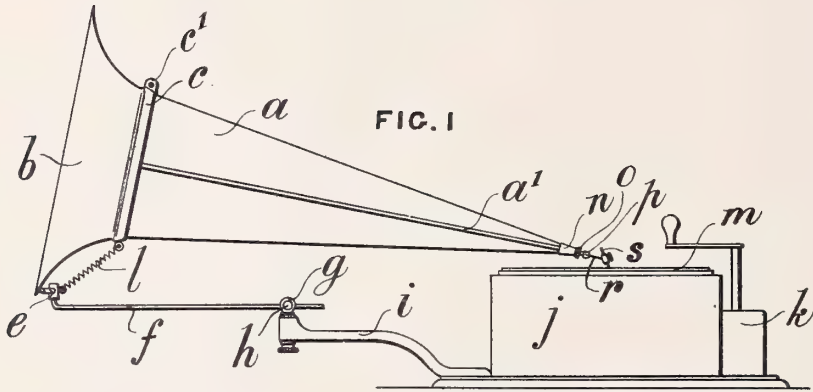
PATENTED JUNE 7, 1904.

J. M. TOURTEL & G. L. HOGAN.

PHONOGRAPH, &c.

APPLICATION FILED SEPT. 5, 1903.

NO MODEL.



Witnesses
L. E. Barkley.
C. E. Helm.

Inventors
John M. Tourtel and
Geo. L. Hogan
By Frank S. Appleman atty.

UNITED STATES PATENT OFFICE.

JOHN MESNY TOURTEL AND GEORGE LEWIS HOGAN, OF LONDON,
ENGLAND.

PHONOGRAPH, &c.

SPECIFICATION forming part of Letters Patent No. 761,729, dated June 7, 1904.

Application filed September 5, 1903. Serial No. 172,120. (No model.)

To all whom it may concern:

Be it known that we, JOHN MESNY TOURTEL and GEORGE LEWIS HOGAN, both citizens of the United Kingdom of Great Britain and Ireland, and residents of London, England, have invented certain new and useful Improvements in Phonographs and the Like, of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention consists in the details of construction and in the arrangement and combination of parts to be hereinafter more fully set forth and specifically claimed.

We will now describe our invention with reference to the accompanying drawings, in which—

Figure 1 shows in side elevation a phonograph or talking-machine constructed according to our invention. Fig. 2 shows an enlarged view from the top of the mouth of the trumpet and shows the slot in the flange and the means for adjusting the same. Fig. 3 shows a view in section of the joint between the celluloid body of the trumpet and the metal mouthpiece. Fig. 4 shows an enlarged view of the center of the combination-bracket for supporting the trumpet. Fig. 5 shows an end view of the combination-bracket and shows the rod fitting into the hinged ferrule on the mouth of the trumpet. Fig. 6 shows a view, partly in section, of the apex of the trumpet and shows the flat spring and its connection to the trumpet and to the stylus. Fig. 7 shows a plan view of Fig. 6 as seen from above. Figs. 8 and 9 are respectively front and edge views in elevation of one form of flexible stylus.

a is the celluloid body of the trumpet, having flange *a'* along its side.

b is the mouth of the trumpet, formed with flange *c*, on which are metal lugs *c'* at each side of the slot *b'*, said lugs being held to each other by thumb-screw *d*.

e is the hinged ferrule on the mouth *b*.

f, *g*, *h*, and *i* are respectively the bent rod, the short bar, the set-screw, and the arm forming the bracket for the trumpet.

j is the cabinet of the machine, with usual spring driving mechanism *k*.

l is a light spiral spring attached at one end to the ferrule *e* and at the other end to the flange *c*. The spring is for the purpose of exercising the necessary downward pressure of the apex of the trumpet.

The foregoing need not, it is thought, be further described in detail, since the parts are illustrated and described for the purpose of showing the application of our invention in certain relation to parts of a phonograph.

m is the usual disk record in which the sound-writing is made.

n is the cap on the apex of the trumpet and covers plug *n'*, into which is screwed bar *p*, carrying lock-nut *o*, and to which bar is fixed one end of the spring *r*, the other end terminating in the stylus-holder *r'*, in which is fixed stylus *s*.

o' is a washer between the lock-nut *o* and the plug *n'*.

In Figs. 8 and 9 the stylus *s* is flattened at *s'*.

It is obvious that other means besides a flexible flat spring may be provided to effect the purposes herein set forth, and in accordance with our invention we may construct in other ways than those previously described a stylus or stylus-support, or both, flexible in one direction to a sufficient extent to render it or them useless as a conductor of sound-vibrations from motion in that direction and effective as a conductor of vibrations corresponding to sound-writings from motions in another approximately normal direction.

What we claim, and desire to secure by Letters Patent, is—

1. In a phonograph, a trumpet, a plug in the apex thereof, a rod threaded in the plug, a nut threaded on the rod and adapted to abut the apex of the trumpet for holding the plug in contact with the trumpet.

2. A reproducing-trumpet for phonographs or gramophones, formed of a resonant material, the apex of the trumpet being fitted with a plug, into which is screwed a rod with a lock-nut, said rod being connected to a spring fixed
5 to a stylus-holder, substantially as and for the purpose described.

3. In a phonograph, a trumpet, a plug fitted in the apex of the trumpet, means for clamp-
10 ing the plug in contact with the wall of the

trumpet, a stylus and means connected to the plug for carrying the stylus.

In witness whereof we have hereunto set our hands in presence of two witnesses.

JOHN MESNY TOURTEL.
GEORGE LEWIS HOGAN.

Witnesses:

WALTER J. SKERTEN,
W. M. HARRIS.

No. 761,846.

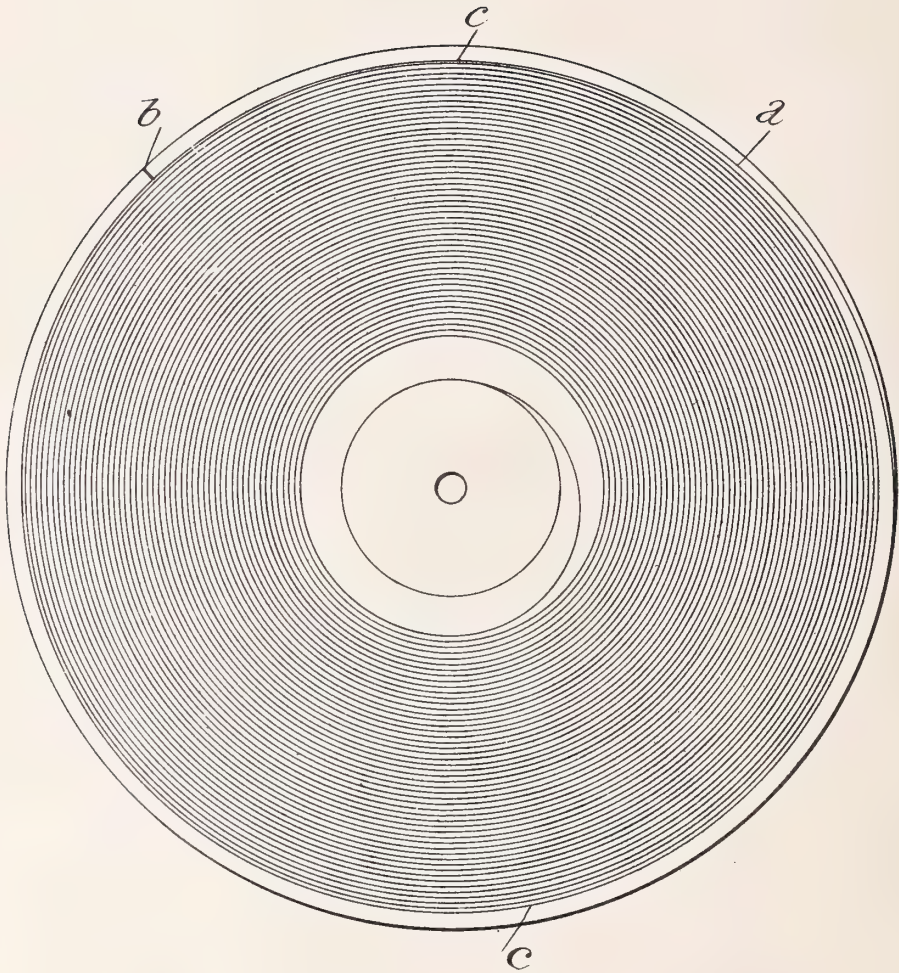
PATENTED JUNE 7, 1904.

O. MESSTER.

TABLET FOR SOUND REPRODUCING MACHINES.

APPLICATION FILED NOV. 3, 1903.

NO MODEL.



Witnesses
T. P. Britt
E. C. Duff

Inventor
Oskar Messter,
by C. E. Duff, San
Attys.

UNITED STATES PATENT OFFICE.

OSKAR MESSTER, OF BERLIN, GERMANY.

TABLET FOR SOUND-REPRODUCING MACHINES.

SPECIFICATION forming part of Letters Patent No. 761,846, dated June 7, 1904.

Application filed November 3, 1903. Serial No. 179,709. (No model.)

To all whom it may concern:

Be it known that I, OSKAR MESSTER, engineer, a subject of the King of Prussia, Emperor of Germany, residing at No. 151 Friedrichstrasse, Berlin, Germany, have invented certain new and useful Improvements in Tablets for Sound-Reproducing Machines, of which the following is a specification.

Gramophone-plates are already known according to which the phonic line runs out in a branch terminating at the periphery of the plate and containing no phonic impressions, the purpose being to insure the proper introduction of the reproducer point or pin at the commencement of the phonic line. Furthermore, this branch, which joins the phonic line at its termination, has already been provided with a starting-mark or the like in order, for example, in displaying talking photographs to enable exact adjustment of the gramophone plate and film, or, for instance, in the case of the exhibition of a gramophone with several synchronously-rotating plates and a corresponding number of reproducers to commence in exactly the same manner. With these well-known gramophone-plates, however, there is the disadvantage that although the pin or point may be set exactly upon the branch possessing no phonic impressions disturbances nevertheless occur, owing to the pin at the junction of the branch line and the phonic line instead of entering at the commencement of the latter frequently springing over to the second or third line from the periphery of the plate, whereby naturally the commencement of the piece of music or speech or the like remains wanting and the readjustment of the pin is rendered necessary. These inconveniences are overcome by my invention, as illustrated in the accompanying drawing, in which the figure shows a plan of the new gramophone-plate.

As the drawing shows, the plate is provided at one side with the branch line *a* for introduction of the pin and on the other side with

a commencing-mark *b* on the spiral or phonic line *c*. It is thus only necessary after inserting the point in the branch to slowly rotate the plate until the pin reaches the starting-mark *b*, whereupon the plate is allowed to start its proper rotation. In this manner guarantee is afforded that the pin properly enters the first line and that, for instance, in the already-mentioned case the phonic lines of all plates commence to cooperate in exactly the same manner with the corresponding reproducer-pins.

The new device is naturally also applicable to phonograph-cylinders. The gramophone-plate has here merely been recited as an example.

It will further be understood that the commencing-mark *b* may be replaced by limiting the partial rotation of the plate, which is necessary prior to actually starting the same by means of a stop or other suitable device.

The method here described is, as already remarked, of especial service in exhibiting talking photographs, for which it is important to be able to adjust the starting-mark of the film in exact correspondence with that of the gramophone-plate.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

A gramophone-plate or phonograph-cylinder, having the phonic line *c*, a starting-mark *b*, on the phonic line, and a branch line *a* curving inward from the outward edge of the plate and entering the phonic line at or behind the starting-mark, whereby the proper introduction of the reproducer-pin in the phonic line is insured, substantially as described.

In witness whereof I have hereunto signed my name, this 19th day of October, 1903, in the presence of two subscribing witnesses.

OSKAR MESSTER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.

76290-

No. 762,904.

PATENTED JUNE 21, 1904.

G. C. HOLDEN.
GRAPHOPHONE.

APPLICATION FILED SEPT. 29, 1903.

NO MODEL.

2 SHEETS—SHEET 1.

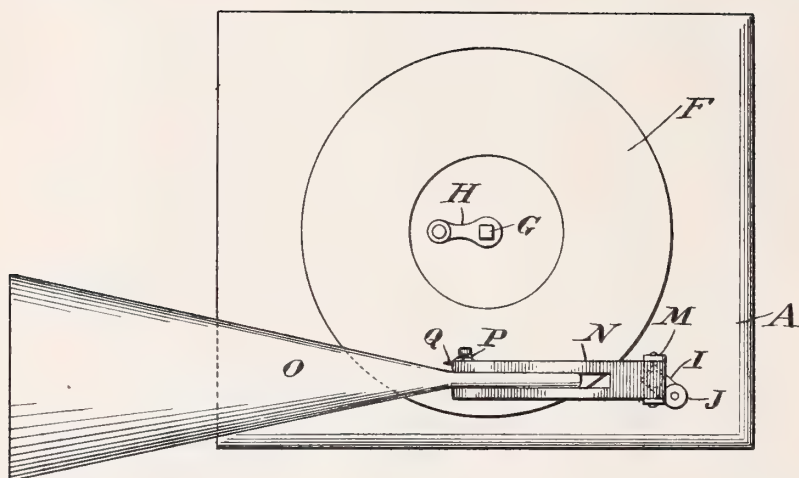


Fig. 1.

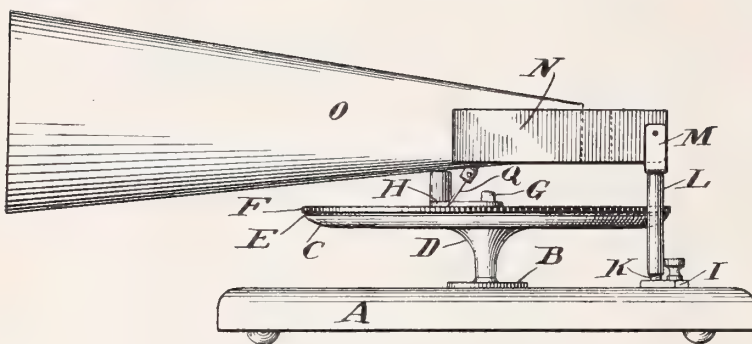


Fig. 2.

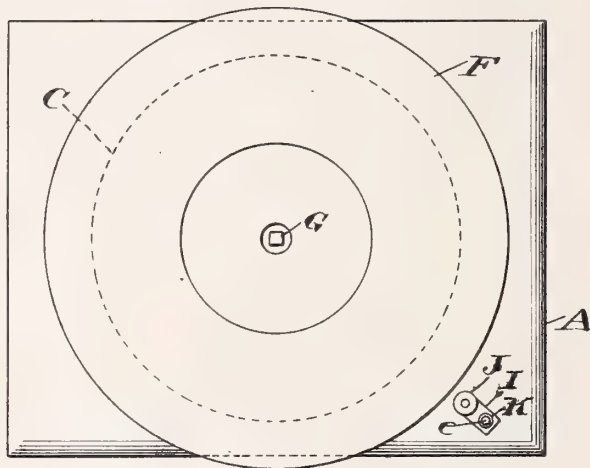


Fig. 3.

Witnesses:
W. B. Hallack
L. H. Morrison

Inventor:
George C. Holden
By *W. J. Sullivan*
Att'y.

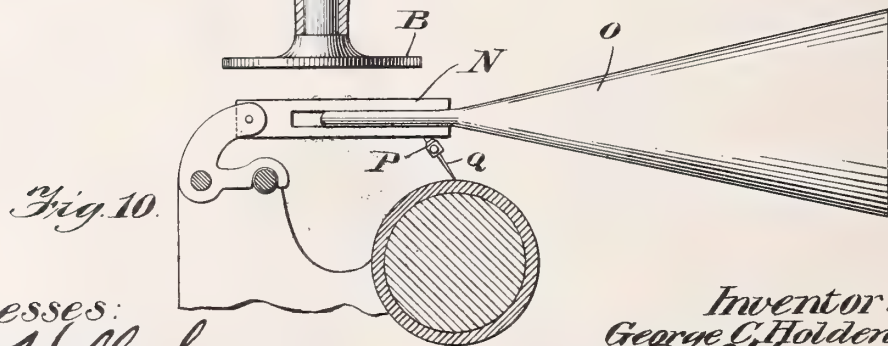
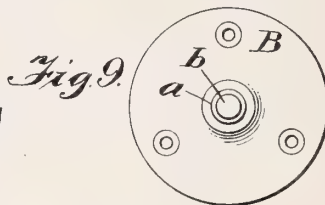
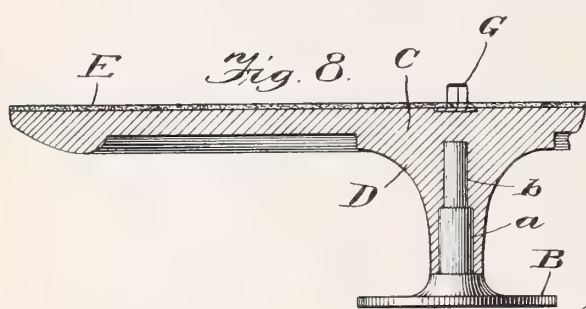
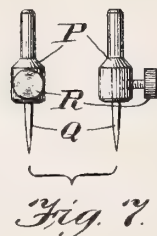
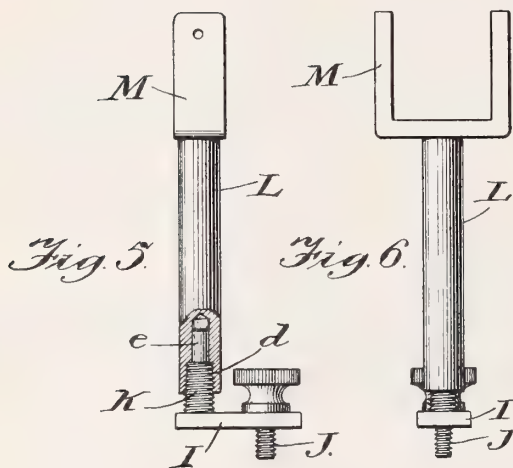
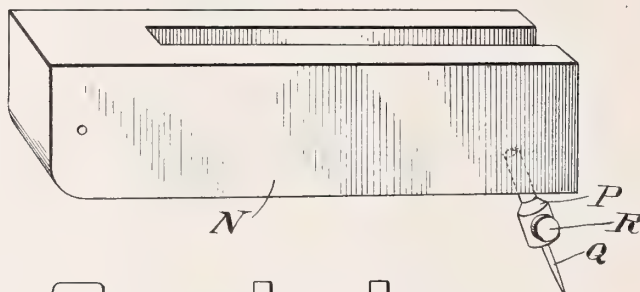
G. C. HOLDEN.
GRAPHOPHONE.

APPLICATION FILED SEPT. 29, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

Fig. 4.



Witnesses:
H. B. Hallack,
L. A. Morrison

By

Inventor:
George C. Holden,
W. F. Williams
Atty.

UNITED STATES PATENT OFFICE.

GEORGE C. HOLDEN, OF WAYNE, PENNSYLVANIA.

GRAPHOPHONE.

SPECIFICATION forming part of Letters Patent No. 762,904, dated June 21, 1904.

Application filed September 29, 1903. Serial No. 175,098. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. HOLDEN, a citizen of the United States, residing at Wayne, county of Delaware, and State of Pennsylvania, have invented a certain new and useful Improvement in Graphophones, of which the following is a specification.

My invention relates to a new and useful improvement in talking-machines, and has for its object to provide a machine for reproducing sounds from records in a simple and effective manner by the use of a vibratory fork and to provide for such adjustments as will permit of the use of various sizes of record-disks.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of my improvement; Fig. 2, a side elevation of the same; Fig. 3, a view similar to Fig. 1, the vibratory fork, horn, and record-disk being removed; Fig. 4, an enlarged perspective of the vibratory fork, showing the needle-socket and needle in place; Fig. 5, an enlarged view of the adjustable block and swinging post, the lower end of the latter being broken away to show the threaded stud on which the post is mounted; Fig. 6, a similar view taken at right angles to Fig. 5; Fig. 7, a detail view of the needle-socket and needle; Fig. 8, an enlarged section of a portion of the turn-table, showing how the latter is mounted upon the central stud; Fig. 9, a plan view of the central stud, and Fig. 10 a modification of the adaptation of my improvement to a cylinder talking-machine.

In carrying out my invention as here embodied A represents a base or block of suitable design for supporting the various parts of the device, and in the socket of this base is secured a stud B, which projects upward and consists of two sections *a* and *b* of different diameters, as clearly shown in Fig. 8.

C represents the turn-table, having a downwardly-projecting hub D with a central opening therein adapted to fit the two diameters of the stud B. The object of this construction is to give the turn-table an extended bearing which will permit it to turn true on its axis. The turn-table is preferably of cast metal, so as to have sufficient weight to act as a balance-wheel when the device is in operation.

A layer of felt E or other suitable material is secured to the upper surface of the turn-table, and the record-disk F is laid loosely thereon. A crank-pin G extends through a central hole in the disk to receive the crank H, whereby the turn-table is revolved and with it the record-disk.

I is an adjustable block secured to the base A by means of a suitable set-screw J, and projecting upward from the outer end of this block is a stud K, the lower portion *d* being screw-threaded, while the upper portion *e* thereof terminates in the form of a pin.

The post L has its lower end drilled and threaded, so as to screw onto the section *d* of the stud K and snugly fit the section *e* thereof, and this arrangement permits the post L to oscillate back and forth on the stud K and at the same time prevent the accidental displacement of the post. The upper end of the post L terminates in the fork M, between which is pivoted the vibratory fork N, as clearly shown. This vibratory fork is preferably made of wood, but of course may be made of any suitable material, and is adapted to receive the inner end of the horn O, which may be made of any suitable material for amplifying the sound generated in the vibratory fork. One prong of the vibratory fork has secured therein the needle-socket P, in which the needle Q is secured by a set-screw R.

In operating the device a record-disk is placed upon the turn-table and the needle properly located thereon, after which the turn-table is revolved by means of the crank, and the vibrations which the needle receives from the various lines and the record-disk are transmitted to the vibratory fork, by which they are converted into sound vibrations, the horn being utilized to amplify the latter. By ex-

periment I have found that this form of vibratory fork is essential to the proper reproduction of sound from the record-disks, its function being to give tone and harmony to the sound vibrations and transmit the same to the horn, and I have also found by experiment that by the use of wood as a vibratory fork a metallic sound attained upon the use of diaphragms is overcome and a true tone is produced.

Another important feature of my improvement is the adjustable block I, which permits the use of various-size record-disks by simply swinging this block inward or outward, so as to carry the post L toward or away from the center of the turn-table, as will be readily understood, and still another important feature of my improvement is the manner in which the post L is secured to the block I, which permits it to freely swing upon its axis and yet prevent it being accidentally displaced therefrom.

In Fig. 10 I have shown a slight modification in the adaptation of my improvement, in which the vibratory fork N is pivoted at right angles to the position shown in the preceding figures and the needle-socket P projects downward from the lower prong of the fork, thus adapting my improvement for use in a talking-machine using cylindrical records.

Having thus fully described my invention, what I claim as new and useful is—

1. In a sound-reproducing machine, a suitable base, a stud projecting upward therefrom having two sections of different diameters, a

turn-table having a downwardly-projecting socket adapted to fit the two diameters of the stud, means for revolving the turn-table, an adjustable block secured upon the base, a stud projecting upward from the outer end of the block, said stud having two sections, one of which is threaded, a post having a socket in its lower end adapted to fit the plain portion of the stud whereby said post is permitted to oscillate on its axis, the lower portion of said socket being threaded so as to screw upon the screw-threads of said stud, a wooden vibratory fork pivoted to the post, said vibratory fork carrying a needle-socket, and a horn secured between the prongs of the vibratory fork whereby the sound vibrations generated in said fork are amplified, as and for the purpose specified.

2. In a sound-reproducing machine, an adjustable block secured to the base of the machine, a stud carried by the outer end of said block, said stud having one section thereof screw-threaded and the other section plain, a post having a socket in its lower end adapted to fit the plain section of the stud, the lower portion of said socket being threaded so as to screw upon the screw-threads of said stud, as and for the purpose specified.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

GEORGE C. HOLDEN.

Witnesses:

MARY E. HAMER,
L. W. MORRISON.

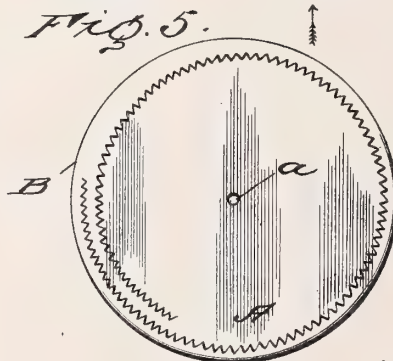
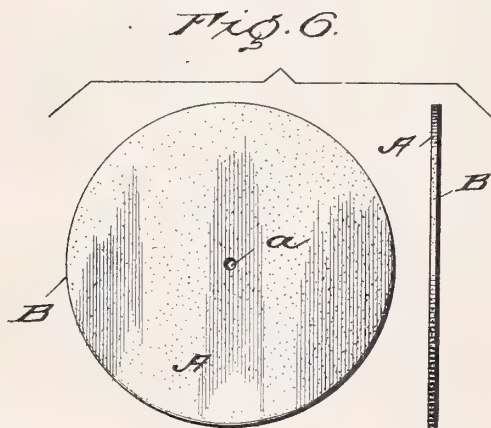
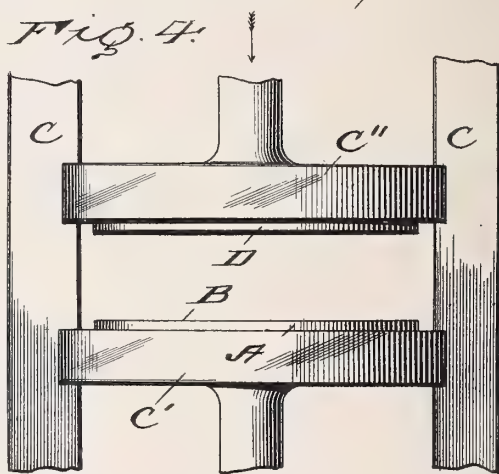
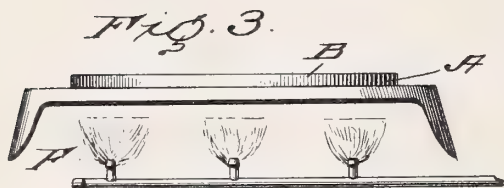
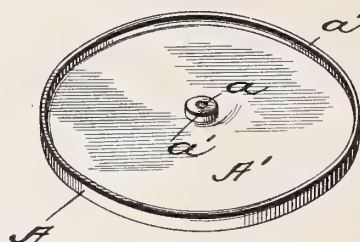
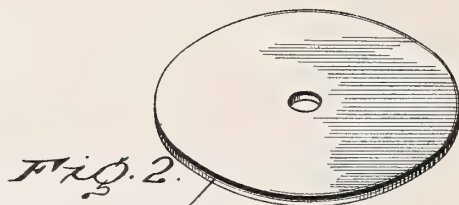
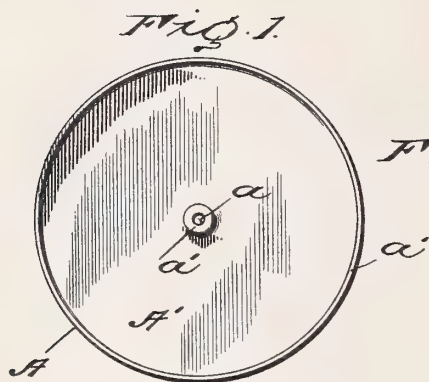
No. 763,564.

PATENTED JUNE 28, 1904.

J. W. JONES.
PRODUCTION OF SOUND RECORDS.

APPLICATION FILED MAR. 27, 1902.

NO MODEL.



Inventor

Witnesses
J. W. Jones
H. B. Berkman

By

Joseph W. Jones
Philip Mawer Attorney

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y.

PRODUCTION OF SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 763,564, dated June 28, 1904.

Application filed March 27, 1902. Serial No. 100,319. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, a resident of the borough of Manhattan, city of New York, State of New York, have invented a new and useful Improvement in the Production of Sound-Records, which invention is fully set forth in the following specification.

This invention relates to the production of disk sound-records; and it consists in improvements in the method of impressing into hard material copies from flat matrices made in the ordinary manner, preferably sound-records in which the sound is represented by a groove of uniform depth containing lateral undulations corresponding to sound-waves.

As the invention consists in improvements over the process now employed, it becomes necessary to state briefly the method now used for this purpose. In impressing records from matrices by the present process a hydraulic press and two steel dies are employed. The lower die contains a recess a little larger in diameter than the matrix and considerably deeper. The matrix is placed in this recess face upward, and a sheet of vulcanite, electrose, or the like, commonly spoken of as "fibrous material," is placed over it, rising above the face of the die. The upper die has a flat smooth face and is placed upon the top of the lower die, so as to rest upon the material. These parts, the upper and lower dies, and the matrix and material are then heated. The whole after being thus heated is placed between the plates of the hydraulic press, and upon forcing the two dies together the material is impressed into the matrix. It must then stand for several minutes in order to permit the material to cool and become set. After this the press is opened and the dies removed, and then it is a work of considerable time and difficulty to remove the record from the seat in the lower die. The production of one record consumes at least five minutes, so that twelve records per hour is a good average.

The present invention consists in an improved process of making sound-records of the character above described, which process, broadly stated, consists in placing a thin blank of impressible material in solid form upon a

suitable backing and then simultaneously uniting the blank and its backing while impressing a sound-record into the surface of said blank by means of a suitable matrix.

The invention will best be understood by reference to the accompanying drawings, which illustrate the various steps.

Figure 1 represents a blank which ultimately forms the backing or core. Fig. 2 represents such a blank with the record material to be placed on it. Fig. 3 shows the same being heated. Fig. 4 shows the same in place in a press. Fig. 5 shows the same after it has received the impression of the record, and Fig. 6 shows the same with its edge burnished and its edge and back rendered waterproof.

I first take a blank A of suitable material, to be more fully explained hereinafter, but preferably of pasteboard. This is cut into a circular form with an opening *a* in the center. Preferably the surface of this blank is depressed, as at A', so as to produce the outer and inner circular rims *a'*. The cutting of the blank and the depressing of portion A' may be performed at a single operation. A sheet B of the recording material whose requirements will be more particularly described hereinafter, but which is preferably of duranoid or of any substance commonly called "fibrous material," is laid upon the blank or in the annular depression A' in case the rims *a'* are present. The thickness of the blank is preferably about one thirty-second of an inch and the height of the rims is about the same, while the thickness of the sheet B of fibrous material fills in the annular space to the height of the rims—that is, about one thirty-second of an inch thick—the whole article, which I designate a "tart," being thus about one-sixteenth of an inch thick. This tart is then heated, as at F, so as to maintain the plastic or impressible condition of the sheet B, and is ready for the press. The press C is any suitable quick-moving press, as a compound toggle-press or the like.

C' represents the lower plate, and C'' the upper. These plates do not require to be either cooled or heated. The matrix D is secured in any desirable manner to the upper plate or

plunger on the press. The warm tart is now placed on the lower plate of the press, and the plunger descending compresses the tart to about one-half its former thickness, or to
 5 about one thirty-second of an inch, at the same time impressing the matrix D into the material B. Owing to the thinness of the sheet B, there is no necessity to wait any appreciable time for the material to cool. More-
 10 over, the quickness of the stroke prevents the material from adhering to the face of the matrix. It is also a peculiarity of pasteboard and similar cellular bodies that under pressure they simply flatten and do not spread out or
 15 "creep." The record thus made is at once removed from the press and may now be employed for reproduction. It is better, however, to give the record a finish, as in the following manner: It is placed between two rapidly-revolving circular plates of the same di-
 20 ameter as the record and the outer edge trimmed off and then burnished and coated with waterproofing. The back of the pasteboard is similarly waterproofed, so that the
 25 blank becomes in fact a "core." This article weighs about one-third of the disk sound-record now made.

According to my method, inasmuch as no delay is necessary for cooling the material and
 30 as no manipulation is required to remove the record from a die and also owing to the fact that I can employ a quick-action press, I have been able to make records at the rate of at least ten per minute, which is six hundred per
 35 hour, as contrasted with the twelve per hour by the present process, or fifty to one. Owing to the thinness of sheet B, I use only one-fourth the quantity of plastic material heretofore employed. My invention thus reduces
 40 the cost both of material and labor.

While I have referred to the blank or core as consisting of pasteboard, yet I may employ any suitable and inexpensive backing that is light and durable and not liable to warp or
 45 crack, such as wood fiber and the like, or even metal. Another requirement is that the material of the backing or core should preferably be a poor conductor of heat and should not adhere under pressure to the lower plate
 50 of the press; but it must be such material that the plastic substance employed will adhere closely to it after they are compressed together. It is also desirable that the material employed for this backing should be of such
 55 construction that under pressure it merely flattens and does not spread out or creep. Its coefficient of expansion should approximate that of the recording material. Asbestos fulfils all the foregoing conditions admirably, and
 60 I prefer to employ this material for my blank or core.

I have referred to the material in which the impression is made as "plastic material." I may employ for this purpose any material
 65 normally hard and that can be rendered im-

pressible (or plastic) by treatment, as with heat, in order to receive the impression.

The term "plastic material" as employed by me includes the materials commonly known and used for this purpose, such as celluloid,
 70 vulcanite, hard rubber, duranoid, fibrose, electrose, &c.

The article produced as above consists of a thin plate whose face is composed of a sheet of fibrous material (in the sense just described)
 75 and which contains a backing or core of a lighter and less expensive material and is entirely waterproof. This article gives reproductions just as good as any records on the market and is equally durable. It is far lighter
 80 and is far less expensive, and I may produce fifty of these in the time heretofore required for producing one of the articles now on the market.

The essential feature of the process consists
 85 in doing away with the use of the confining-dies and their necessary heating, in enabling me to employ a quick-action press instead of an expensive and slow-moving hydraulic press, in dispensing with the delays necessary for
 90 cooling and for removing the record from the die, and particularly in enabling me to employ a comparatively very thin sheet of the plastic material. The lighter and cheaper but equally durable and effective sound-record
 95 which I can obtain forms also an essential feature of the invention.

I do not limit myself to the exact steps and devices precisely as pointed out, for changes
 100 may be made in details of construction and procedure without in any case departing from the spirit of my invention.

Having thus described my invention, I claim—

1. The process of impressing a sound-rec-
 105 ord from a suitable matrix, which consists in placing a thin blank of impressible material in solid form upon a suitable backing and simultaneously impressing the matrix into the surface of the blank and uniting the blank
 110 and backing.

2. The process of impressing a sound-rec-
 ord from a suitable matrix, which consists in placing a thin blank of impressible material in solid form upon a suitable backing, heating
 115 said backing and blank thereby softening the latter, and simultaneously compressing the backing and blank together and impressing the matrix into the blank.

3. The process of producing a flat sound-
 120 record from a suitable matrix which consists in placing a thin blank sheet of fibrous material such as duranoid or the like upon a backing of asbestos, pasteboard or the like, and then compressing the two together while si-
 125 multaneously impressing into said fibrous material the record from the matrix.

4. The improvement in the production of flat sound-records from a suitable matrix, which consists in simultaneously compressing
 130

together a thin blank sheet of plastic material
and a thin sheet of suitable backing therefor,
and pressing the plastic material against a
suitable matrix, whereby at a single action
5 the record is produced and its backing secured
thereto.

5. The improvement in the production of
flat sound-records from a suitable matrix
which consists in placing a blank sheet of
10 plastic material upon a suitable backing, then
heating the two, then placing the same be-
tween the plates of a press at normal temper-

ature, and then causing the matrix carried by
one of said plates to be impressed into said
plastic material while said material and back- 15
ing are stamped together by the same action,

In testimony whereof I have signed this
specification in the presence of two subscribing
witnesses.

JOSEPH W. JONES.

Witnesses:

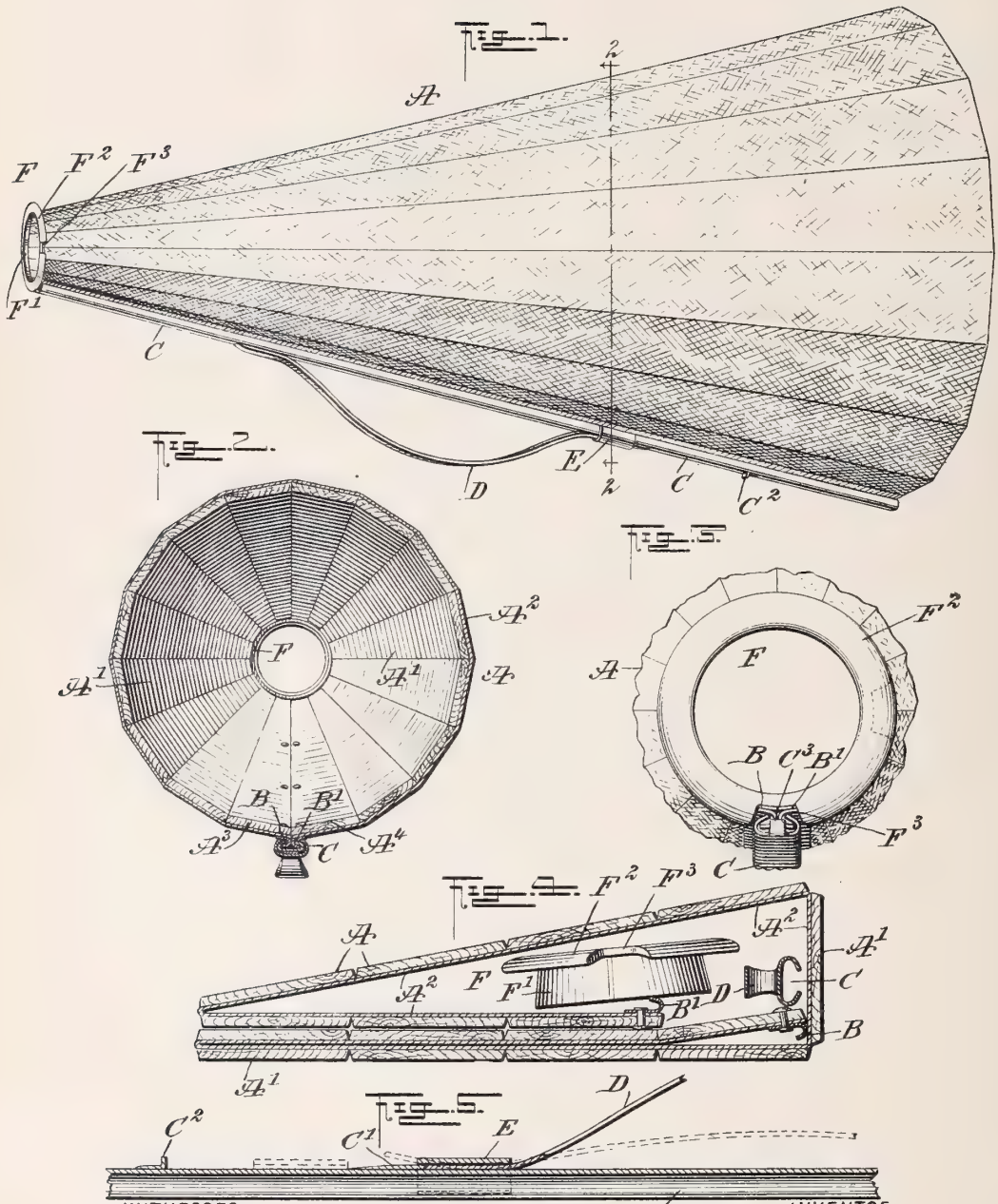
C. A. L. MASSIE,
ELISHA K. CAMP.

No. 763,808.

PATENTED JUNE 28, 1904.

H. STURGES.
COLLAPSIBLE MEGAPHONE.
APPLICATION FILED FEB. 2, 1904.

NO MODEL.



WITNESSES:

Geo. C. Cheney
Neely. Hosted

INVENTOR
Hollister Sturges

BY *Wm. W. W.*
ATTORNEYS

UNITED STATES PATENT OFFICE.

HOLLISTER STURGES, OF NEW YORK, N. Y.

COLLAPSIBLE MEGAPHONE.

SPECIFICATION forming part of Letters Patent No. 763,808, dated June 28, 1904.

Application filed February 2, 1904. Serial No. 191,666. (No model.)

To all whom it may concern:

Be it known that I, HOLLISTER STURGES, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Collapsible Megaphone, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved megaphone adapted to be collapsed and folded into comparatively little space for convenient storing aboard ship or other place and adapted to be quickly and readily extended for use.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the improvement in position for use. Fig. 2 is a transverse section of the same on the line 2 2 of Fig. 1. Fig. 3 is an enlarged end elevation of the improvement. Fig. 4 is an enlarged longitudinal section of the collapsed body, with the locking-slide and mouthpiece shown in elevation; and Fig. 5 is an enlarged longitudinal sectional elevation of the locking-slide and the means for securing the free end of the handle to the slide.

The body A of the collapsible megaphone when extended for use (see Fig. 1) is approximately in the shape of a split truncated cone or many-sided pyramid and is formed of slats A', connected with each other by a fabric A², such as canvas, which fabric forms a cover for the slats and also hinges to hingedly connect the sides of the slats with each other to allow convenient folding of the slats when the body is collapsed. (See Fig. 4.)

The adjacent slats A³ and A⁴ along the split of the body A are provided on the outside with longitudinally-extending guideways B and B', preferably made of metal and adapted to be engaged by a locking-slide C for securely fastening the adjacent edges of the slats A³ and A⁴

together to securely hold the body A in an extended position—that is, in the form of a truncated cone or many-sided pyramid. As shown in the drawings, the side edges of the slats are somewhat beveled, so that when the body A is extended for use the edges of adjacent slats fit snugly together to produce a strong and durable body A.

As shown in Fig. 1, the locking-slide C and the guideways B and B' extend throughout the length of the body A, and on the said slide C is secured one end of a handle D, preferably made of spring metal, adapted to be taken hold of by the operator for using the megaphone for its legitimate purpose. The free end of the handle D is adapted to be engaged by a sleeve E, slidably held on the slide C to firmly lock the free end of the handle in place at the time the said free end abuts against a projection or lug C', formed integrally on the locking-slide C, as plainly indicated in Fig. 5. When the slide C is withdrawn from the guideways B and B' and the body A is collapsed and folded, then the handle D can also be folded snugly against the side of the slide C by the operator moving the sleeve E outwardly to release the free end of the handle D and allow the latter to lie flat against the slide C. In order to prevent the sleeve E from accidental disengagement from the slide C, a stop C² is provided, against which the sleeve E can abut when not in use.

The mouthpiece F for the megaphone is in the form of a beveled ring F', fitting the inside surface of the body A at the apex end, and the said ring F' is provided at its apex end with an outwardly-extending flange F², adapted to abut against the ends of the slats, so as to prevent the mouth of the user of the megaphone from coming in contact with the rough edges of the slats and the canvas. By having the outer side of the ring beveled to correspond to the conical shape of the body A it is evident that the ring F' is securely held in place on the megaphone when the latter is extended or set up; but the mouthpiece can be turned in the apex end of the body A to move a notch F³ in the flange F² in or out of register with the guideways B and B' and the slide C. When the notch F³ is in regis-

ter with the guideways B and B' and the slide C, then the latter can be placed in position on the guideways or removed therefrom; but when the slide C is in position in the guideways and the ring is turned so as to move the notch F³ out of register with the end of the slide and the guideways then the slide C is held against accidental displacement on the guideways B and B'. The slide C is provided with an inturned lug C³ (see Fig. 3) at the apex end of the megaphone for the lug to abut against the ends of the guideways to prevent the slide C from moving out of position in an outward direction on the guideways B and B'.

When the megaphone is extended, as shown in Fig. 1, and it is desired to collapse the megaphone, then the operator first turns the mouthpiece F until the notch F³ is in register with the guideways B and B' and the slide C, and then the latter is withdrawn from the guideways through the notch F³ to unlock the body A to allow of folding the same, as indicated in Fig. 4, at the same time allowing removal of the mouthpiece F and storing the same in the folded body A, as indicated in Fig. 4. The slide C may also be placed within the folded body A, as shown in Fig. 4, it being understood that after the slide is removed the handle D is unlocked and folded to take up little room on the slide C, as previously explained.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A collapsible megaphone comprising a body in the form of a split truncated cone, a ring in the apex end of the body, and means for locking and unlocking the sides of the cone at its split, said means being adapted to bring the edges of the cone at its split, into abutting engagement with each other, as set forth.

2. A collapsible megaphone comprising a body in the form of a split truncated cone and made of slats, hingedly connected with each other, the slats at the split being provided with longitudinal guideways, and a locking-slide for removably engaging the said guideways, as set forth.

3. A collapsible megaphone comprising a body in the form of a split truncated cone and made of slats, hingedly connected with each other, the slats at the split being provided

with longitudinal guideways, a locking-slide for removably engaging the said guideways, and a handle on the said locking-slide, as set forth.

4. A collapsible megaphone comprising a body in the form of a split truncated cone and made of slats, hingedly connected with each other, the slats at the split being provided with longitudinal guideways, a locking-slide for removably engaging the said guideways, a flexible handle attached at one end to the said slide, and means on the slide for engaging the free end of the said handle, as set forth.

5. A collapsible megaphone comprising a body in the form of a split truncated cone and made of slats, hingedly connected with each other, the slats at the split being provided with longitudinal guideways, a locking-slide for removably engaging the said guideways, a flexible handle attached at one end to the said slide, a lug on the said slide, for the free end of the handle to abut against, and a sleeve on the slide, for engaging the free end of the handle, to lock the same in place against the lug, as set forth.

6. A collapsible megaphone comprising a body in the form of a split truncated cone, made in foldable sections, a locking device for locking the sides of the split together, and a mouthpiece consisting of a ring provided with beveled sides fitting the inside of the said body at the apex and a flange on the said ring, fitting the apex edge of the body, as set forth.

7. A collapsible megaphone comprising a body in the form of a split truncated cone, made in foldable sections, a locking device for locking the sides of the split together, and a mouthpiece consisting of a ring provided with beveled sides fitting the inside of the said body at the apex and a flange on the said ring, fitting the apex edge of the body, the flange having a cut-out portion for the passage of the movable member of the said locking device, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOLLISTER STURGES.

Witnesses:

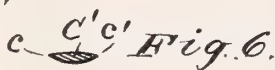
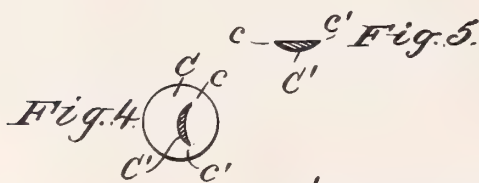
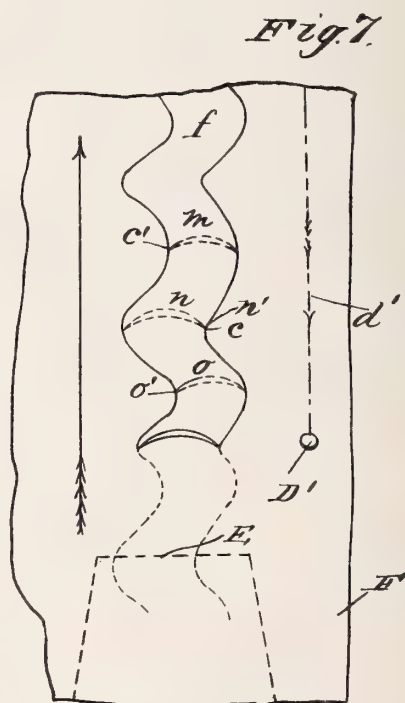
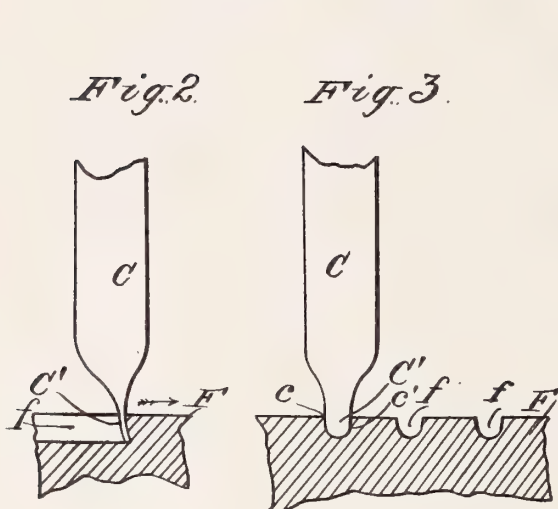
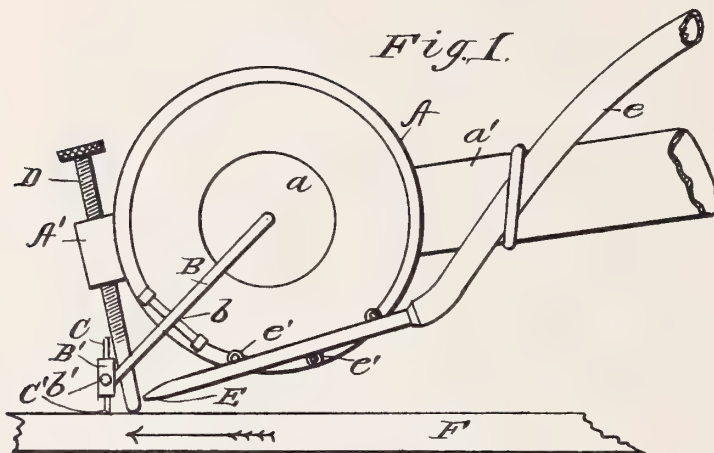
THEO. G. HOSTER,
EVERARD BOLTON MARSHALL.

No. 763,903.

PATENTED JUNE 28, 1904.

J. W. JONES.
SOUND RECORDING APPARATUS.
APPLICATION FILED MAY 1, 1900.

NO MODEL.



Witnesses.

W. R. Edelen.
For Lewis

Inventor

by Joseph W. Jones
Thos. Mauro
his atty.

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

SOUND-RECORDING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 763,903, dated June 28, 1904.

Application filed May 1, 1900. Serial No. 15,056. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, of the city and State of New York, have invented a new and useful Sound-Recording Apparatus, which is fully set forth in the following specification.

This invention relates to a sound-recording apparatus for producing in a suitable recording material grooves of uniform depth containing lateral undulations made by and in accordance with sound-waves, such sound-records being fully set forth in certain pending applications of my own, Serial No. 659,170, filed November 19, 1897, and Serial No. 10,367, filed March 27, 1900.

The invention relates particularly to the novel form of cutting-tool employed.

The original phonograph employed a point to indent the tin-foil, the point acting at right angles to the foil or vertically. The graphophone and the modern phonograph employ as a cutting-tool a small cylindrical stylus whose recording end is cut off square and may be either plane or cupped. In either case the cutting edge is circular, while (since the stylus lies at an angle to the recording-tablet) that portion of this edge which actually does the cutting is a semicircle or less. The gramophone employs a fine point to trace an almost imperceptible line in an acid-resisting film; but in cutting records of the kind described in my pending applications none of these cutting-tools will serve. A fine point would not cut at all, but would merely scratch, and the lines scratched by it (not being cleanly cut) would have jagged edges and would be too narrow for practical reproduction of sound, while if a cylindrical stylus were employed not only would it meet greater resistance and have to tear or plow a furrow instead of cutting it cleanly, with the result of rough jagged edges, but the rearmost part of the cylindrical cutting-tool would not clear the more abrupt of the projections constituting the outline of the record-groove. For this reason it is necessary in making original sound-records of the desired character, consisting of lateral undulations, (to right and left of the normal,)

that the recording-tool cut readily both to right and to left—that is, the recording-tool must be two-edged. Further, it is necessary that the body of the recording-tool be cut away as much as possible immediately behind its cutting edges, so as to leave no shoulder that would fail to clear the projections forming the outline of the groove already cut—that is to say, the most advantageous form of cutting-tool for the purpose in hand may be described as “spoon-shaped” and having two cutting edges.

In the drawings illustrating my invention, Figure 1 is a side elevation showing the complete recording apparatus in operative connection with a recording-tablet, only a portion of the latter being shown. Fig. 2 is a side elevation, on an enlarged scale, of the recording-tool. Fig. 3 is a rear elevation of the same. Fig. 4 is an inverted transverse section through the same, taken on the plane of the recording-surface. Fig. 5 is a sectional view of a modified form of recording-tool. Fig. 6 is a similar view of another modification, and Fig. 7 is a plan view illustrating the mode of operation of the cutting-tool.

A is a suitable head or “sound-box” having a diaphragm *a* and a neck or tube *a'*, that leads to the mouthpiece. (Not shown.) Attached to the center of the diaphragm is an arm B, secured to the frame of the sound-box A, as at *b*, preferably by a pivot, and carrying a substantially vertical tubular head B'.

My new recording-tool C is carried in the head B', as by a set-screw *b'*. On the frame A is a lug A', that provides a bearing for a screw-threaded pin D, which is thus vertically adjustable in its bearing.

E represents the nozzle of a pipe *e* for carrying an air-blast, the pipe *e* being supported in any convenient manner, as by securing it to the neck *a'*, and the nozzle E may be secured to the frame A, as at *e' e'*.

F represents a portion of a suitable recording-tablet, such as described in my said pending applications, the same being mounted to progress in the direction indicated by the arrow in Fig. 1.

The recording apparatus is mounted in any approved manner so as to be in operative contact with the recording-tablet, as indicated in Fig. 1. The rounded foot of the screw-threaded pin D rests upon the uncut surface of the tablet to regulate the depth to which the cutting-tool C enters the recording material—that is, by raising or lowering pin D, I regulate the depth of the sound-groove *f*.

The purpose of the air-blast is to blow away all the cuttings in order to prevent any clogging or interference with the cutting-tool, the nozzle E being directed to deliver its blast around the cutting portions of the tool. I will now describe this cutting-tool C. The main portion of this tool is substantially cylindrical, though this is immaterial. The lower portion *C'* is reduced, as shown by Figs. 2 and 3, to produce a two-edged cutting-tool, preferably spoon-shaped, the cutting edges being indicated at *c c'*. (See Fig. 4.) Fig. 5 shows a modified form, plano-convex in cross-section, and Fig. 6 still another modification; but Fig. 4 shows the preferred form, crescent-shaped in cross-section.

Fig. 7 illustrates the mode of operation of my improved apparatus, the arrow indicating the direction in which the tablet progresses, so that relatively the cutting-tool advances in the opposite direction. In cutting from the position indicated at *m* to the position *n* the cutting edge *c'* has done most of the work, though the other edge *c* does its part in making a clean cut on that side of the groove, the air-blast (from nozzle E) simultaneously removing the loosened material. In passing from the position *n* to that indicated at *o* the edge *c* does most of the work, and so on, the flatness or spoon shape of the tool enabling it to clear projections *n' o'*, &c., readily. D' indicates the position of the rounded foot of regulating-pin D, which slides smoothly over the uncut portion of the polished surface of tablet F to one side of cutting-tool C, its path being indicated by the dotted line *d'*.

While the air-blast coöperates with the cutting-tool in producing the best results, it is not absolutely necessary and may be dispensed with, and the same is true with regard to the regulating-pin.

Having thus described my invention, I claim—

1. A sound-recording tool, of a flattened crescent shape in cross-section, and presenting two cutting edges.

2. A sound-recording tool provided with two separate cutting edges one on either side, said edges being separated by a blunt or rounded bottom.

3. In a sound-recording apparatus comprising a revoluble table carrying a suitable recording-tablet and having a sound-box mounted to travel radially across said tablet, and a sound-diaphragm in said box and disposed at right angles to said tablet, a recording-tool in combination therewith, the latter consisting of a flattened piece of metal presenting two separate and distinct cutting edges on opposite sides thereof and facing respectively in the same directions as the two faces of said diaphragm, the said tool being embedded to a slight yet appreciable distance into the material of said tablet, whereby upon the vibration of said diaphragm the edges will cut alternately in opposite directions, as and for the purpose specified.

4. A sound-recording apparatus comprising a revoluble table carrying a recording-tablet, and a sound-box mounted to travel across said tablet and containing a diaphragm, and in combination with the foregoing a recording-tool connected with said diaphragm, the said tool consisting of a flattened piece of metal presenting two separate and distinct cutting edges on opposite sides thereof, and the said tool being embedded to a slight yet appreciable distance into the material of said tablet, whereby upon the vibration of said diaphragm the edges will cut alternately in opposite directions, as and for the purpose specified.

5. A laterally-vibrating cutting-style for sound-records provided with lateral cutting edges in line with its path of vibration.

6. A laterally-vibrating cutting-style for sound-records provided with lateral cutting edges in line with its path of vibration and provided with a concave face.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH W. JONES.

Witnesses:

C. A. L. MASSIE,
WILLIAM E. HILLS.

72907

No. 763,904.

PATENTED JUNE 28, 1904.

J. W. JONES.
PRODUCTION OF SOUND RECORDS.

APPLICATION FILED JUNE 26, 1902.

NO MODEL.

Fig. 1.

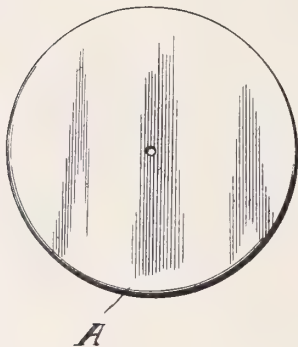


Fig. 2.

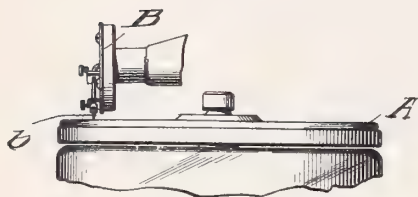


Fig. 2.a

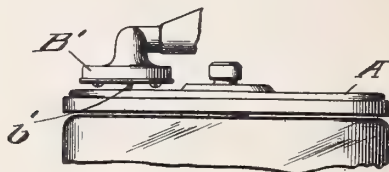


Fig. 3.

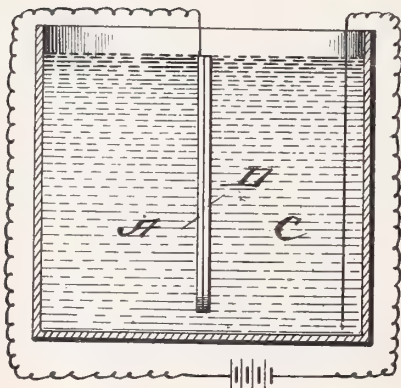
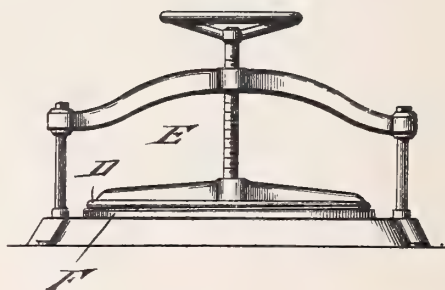


Fig. 4.



Witnesses

Wm. B. Kerkam
J. W. Jones

Inventor

Joseph W. Jones,
By Philip Kaura
Attorney

UNITED STATES PATENT OFFICE.

JOSEPH W. JONES, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GRAPHOPHONE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

PRODUCTION OF SOUND-RECORDS.

SPECIFICATION forming part of Letters Patent No. 763,904, dated June 28, 1904.

Original application filed March 27, 1900, Serial No. 10,367. Divided and this application filed June 26, 1902. Serial No. 113,327. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH W. JONES, of New York, State of New York, have invented a new and useful Improvement in the Production of Sound-Records, which improvement is fully set forth in the following specification.

My invention relates to improvements in the production of sound-records; and it consists in a new system or method of multiplying on a large scale indestructible copies or duplicates of original sound-records.

The present invention is a division of my pending application for production of sound-records, filed March 27, 1900, Serial No. 10,367, patented May 12, 1903, No. 727,960.

Sound-records of the type characterized by vertical irregularities corresponding to sound-waves (commonly known as "graphophone" or "phonograph" records) are engraved in a wax-like material and may be employed directly for purposes of reproduction. Such sound-records are also used for obtaining copies or duplicates of the original by the well-known mechanical process of duplicating by means of a "duplicating-machine." The making of each duplicate defaces the original sound-record more or less, so that the duplicates get poorer and poorer as the process is continued, while the original sound-record is soon worn out. Again, sound-records characterized by lateral undulations (the type being commonly known as "gramophone-records") before the date of my invention were produced by tracing a line in a thin film deposit on a plate, which was then subjected to an etching-bath. From the etched plate thus obtained an electroplate was produced in the well-known manner and the electroplate impressed into suitable material to produce the commercial gramophone sound-record of that date. This method of producing sound-records contained many defects not necessary to point out here, and the copies produced were not correct representations of the path of the recording-stylus. The method has been altogether discarded.

My present invention applies to records of

either the vertically-undulated type or of the laterally-undulated or zigzag type.

Briefly stated, it consists in making the original record-groove of full size in or upon a surface suitable for recording and which surface at the same time is itself an electroconductor, then electroplating such record-surface, and finally separating the electroplate-matrix and employing it as a die for impressing into a tablet of suitable material.

To obtain the recording material for my improved process, I take any substance that has sufficient body or cohesion to withstand the electroplating step and retain its form, while at the same time it must be capable of receiving a record—that is, be readily removable by the recording-stylus with as little resistance as possible. It must, further, be essentially free from granular or gritty conformations, and it must present sufficient body or stiffness to the edge of the cutting-tool to prevent being merely displaced rather than engraving-tool. This material may be designedly cut or scratched by the action of the nated for the purpose of this invention and application as "wax-like," which term will be used herein to designate any material suitable for the purpose of engraving by a recording-tool and with sufficient body to retain its shape. This wax-like material is rendered electroconductive, as by impregnation with some electroconductor—as an example, finely-powdered graphite. I thus obtain a material suitable for recording and which at the same time is itself an electroconductor. The proportion of conducting material employed may be varied according to circumstances, depending upon the character of the ingredients and the kind of conductor employed. The foregoing is only one way of preparing the desired recording material. Instead of taking a non-conductive material and mixing it with a conducting material I may take any sufficiently soft substance that is already a conductor, such as the softer metals or alloys well known in the arts—antimony, bismuth, lead, Babbitt's metal, or the like. The recording

material being thus procured is shaped into tablets or disks for use. Better effects are obtained by burnishing the surface of the disk before attempting to record thereon. It is then placed upon a suitable sound-recording machine, and the sound-record is made in or upon the surface of the tablet. The grooves are cut or engraved or gouged or scratched therein by means of the recording-tool once for all of full depth and size and require no subsequent deepening or enlargement by an etching fluid or otherwise. The record-groove may be either of the vertically-undulated (graphophone) type or of the laterally-undulated (gramophone or zigzag) type. This original record is next placed in an ordinary electroplating-bath and a coating or plate of metal deposited thereon by electrolysis in the well-known manner. The electroplate and the original are then separated, and the latter may be used repeatedly in the same manner to produce other matrices. The electroplate-matrix thus obtained is impressed into a tablet of suitable material to produce the commercial sound-record. It is employed with any convenient press and with any suitable "fibrous" material, so called, in the well-known manner.

In the drawings annexed hereto to illustrate this invention, Figure 1 shows a recording-tablet which is both susceptible of being engraved by a recording-tool and is at the same time electroconductive. Fig. 2 shows the same undergoing the process of recording. Fig. 2^a is a modification showing another type of recording apparatus. Fig. 3 shows the original sound-record in an electroplating-bath, and Fig. 4 shows the same being used as a matrix.

In the drawings, A represents the tablet, which is both wax-like—*i. e.*, susceptible of being engraved—and electroconductive.

B indicates part of the sound-recording apparatus, in which *b* is the recording-tool. B' indicates another type of recording apparatus, and *b'* its recording-tool.

C is an electroplating-bath, and D is the electroplate deposit upon the original record A.

E represents a press in which the electroplate-matrix D is being forced into the tablet F.

Various changes in details may be made without departing from the spirit of my invention, which consists in avoiding the step of covering an original sound-record with a coating of graphite or the like in order to render the surface thereof electroconductive.

Having thus particularly described my in-

vention and the various details for carrying the same into effect, I claim—

1. The herein-described method of forming a matrix, which consists of forming an original sound-record groove of full size and depth in or upon an electroconductive wax-like recording material, and then subjecting the same directly to electrolysis, and finally separating the electroplate-matrix from the original tablet.

2. The process of multiplying copies of a sound-record, which consists of forming the original record-groove of full size and depth in an electroconductive wax-like recording-surface, then depositing a matrix directly thereon by electrolysis, and finally impressing the matrix into or upon a suitable material to produce the copies.

3. The process of producing sound-records in hard material, which consists of preparing a tablet of material simultaneously wax-like and electroconductive, then subjecting the same to the action of a suitable recording apparatus, then depositing an electroplate upon the same, and finally impressing said electroplate as a matrix directly into a tablet of suitable material to produce the ultimate sound-record.

4. The herein-described method of producing sound-records in hard material, which consists of: first engraving or scratching the original record-groove into a suitable tablet of wax-like electroconductive material, second depositing an electrodeposit directly on the wax-like surface, third separating the same from the electroplate-matrix thus produced, and fourth impressing said matrix into a tablet of so-called fibrous material, all substantially as described.

5. The process of making hard sound-records, which consists of: first, rendering homogeneously electroconductive a recording material which continues to be susceptible of being acted on by a sound-recording tool; second, producing in said electroconductive material by the action of such tool a record-groove of full size; third, producing a matrix directly upon said recording material by electrolysis; and, fourth, impressing said matrix into a tablet of suitable material that will become hard.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH W. JONES.

Witnesses:
ELISHA K. CAMP,
C. A. L. MASSIE.

T. H. MACDONALD.
SPEED REGULATOR AND STOP MECHANISM.

APPLICATION FILED JAN. 31, 1903.

NO MODEL.

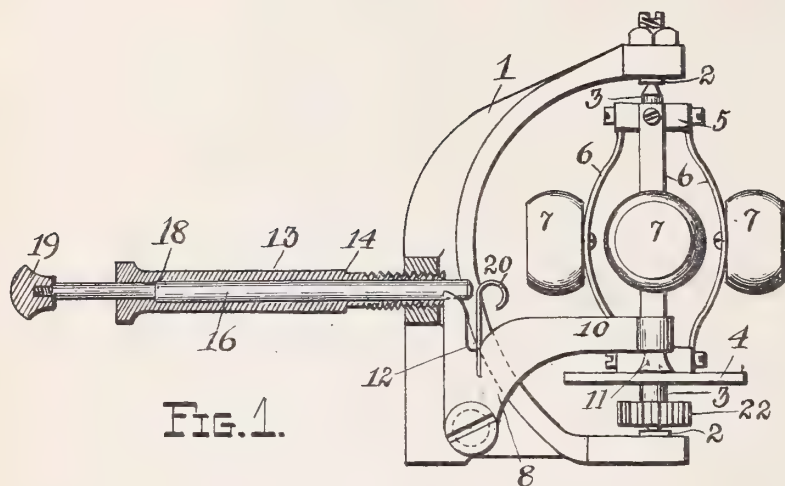


FIG. 1.

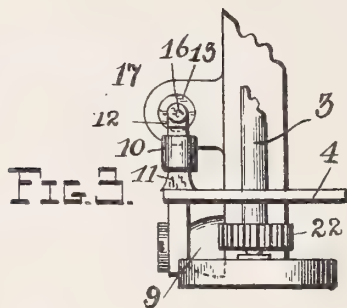


FIG. 2.

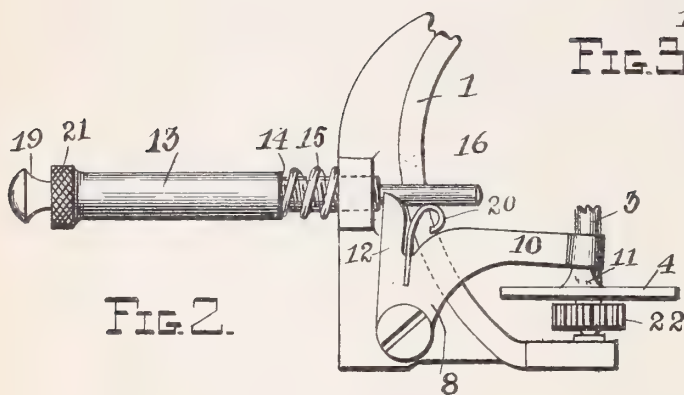


FIG. 2.

Thomas Macdonald Inventor

By Mauro Curren Lewis
his Attorneys

Witnesses

J. R. Thompson
Wm. B. Berkman

UNITED STATES PATENT OFFICE.

THOMAS H. MACDONALD, OF BRIDGEPORT, CONNECTICUT.

SPEED-REGULATOR AND STOP MECHANISM.

SPECIFICATION forming part of Letters Patent No. 725,857, dated April 21, 1903.

Application filed January 31, 1903. Serial No. 141,242. 'No model.'

To all whom it may concern:

Be it known that I, THOMAS H. MACDONALD, a resident of Bridgeport, Connecticut, have invented a new and useful Improvement in
5 Speed - Regulators and Stop Mechanisms, which invention is fully set forth in the following specification.

This invention relates to speed-governing and stop devices for motors, and more particularly to that class of speed-governing and stop devices designed for use in connection with spring or weight-driven motors. In devices of this kind it has heretofore been proposed to connect a governor-shaft by suitable
15 gearing to the main power-shaft and to slidably mount a friction-disk on the governor-shaft, connecting said disk to one end of spring-blades carrying suitable weights, the other end of the spring-blades being fixedly
20 secured to the governor-shaft, so that the centrifugal action of the weights when the motor is in motion draws the friction-disk along the governor-shaft against a friction-pad mounted on a lever, controlled by a screw
25 adjustment, so as to cause the pad to resist with greater or less force the sliding action of the disk. In addition to the screw independent means were provided for throwing the pad against the disk with such force as
30 to stop the motor. The present invention is an improvement on this structure and is designed to simplify the construction and so construct, combine, and arrange the several elements that they may be formed by automatic machinery, quickly assembled, and
35 readily manipulated to control the motor. The inventive idea involved may receive various mechanical expressions, one of which is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of the improved speed-governor and stop device, showing the parts in running position. Fig. 2 is a side elevation with
45 parts broken away, showing the device in position to stop the motor; and Fig. 3 is a right-hand elevation of Fig. 2.

In said drawings, 1 is a bracket or other suitable part of the motor frame or support,
50 having bearings 2 2 for the governor-shaft 3,

on which disk 4 is slidably mounted. A collar 5 is fixed to the shaft 3, and the spring-blades 6 are secured at one end to the collar 5 and at the other end to the disk 4, weights 7 being carried by the spring-blades. A bell-
55 crank lever 8 is pivoted to a boss 9 on the frame 1 and has one arm 10 extending between the disk 4 and the weights 7, which arm carries a friction-pad 11, of leather or other suitable material, in contact with or
60 close proximity to the disk 4. The other arm 12 of the bell-crank lever 8 projects opposite the end of a hollow screw 13, threaded in the frame 1, so that as the screw is advanced inwardly through the frame it bears on the arm
65 12 and forces the pad 11 toward the disk 4. The screw 13 has a shoulder 14, and a spring 15 reacts between this shoulder and the frame 1. A stop-rod 16 passes through the hollow
70 screw 13, with one end projecting over the arm 12 of lever 8, the end of the arm being preferably cut out, as shown at 17, Fig. 3, to accommodate the stop-rod. A shoulder 18 on the rod engages a corresponding shoulder in
75 the interior of the screw 13, and the outer end of the rod is provided with a knob or head 19, screwed or otherwise secured thereto, while the screw 13 is preferably knurled, as at 21. Projecting from the lever 8 and
80 into the path of the stop-rod 16 is a yielding member, preferably in the form of a steel blade 20 of such stiffness that sufficient pressure may be exerted through it to force the
85 pad 11 against the disk 4 hard enough to stop the motor. Preferably the spring-blade 20 is curved at its upper end, as in Fig. 1, and when the stop-rod is forced against it it is bent into the position shown in Fig. 2. The governor-shaft is connected to the motor-shaft in any suitable way, as by a gear-
90 wheel 22.

The operation is as follows: When the motor is running, the parts are as shown in Fig. 1, and the screw 13 is advanced against the arm 12 of lever 8 if it be desired to slacken
95 the speed of the motor and withdrawn if it is desired to increase the speed. When it is desired to stop the motor, the stop-rod is pushed in, bending the spring-blade 20 down forwardly, thereby tilting the lever 8, so as to 100

bring the pad 11 forcibly against the disk 4 (see Fig. 2) and stopping the motor. To start the motor, the operator grasps the knob 19 and withdraws rod 16 from the position shown in Fig. 2 to that of Fig. 1.

Owing to the cylindrical form of the screw 13 and the stop-rod 16, they are readily turned out by automatic machinery, thereby greatly cheapening and facilitating their construction, while other elements, as the lever 8 and disk 4, are struck out by suitable metal-working dies. Moreover, it will be observed that the spring-blade 20 not only transmits pressure from the stop-pin to the brake-lever 8, but also reacts against the stop-pin to retain it yielding in position to stop the motor, as shown in Fig. 2.

Having thus described the invention, what is claimed is—

20 1. In a stop device for motors, a brake-lever, a sliding stop rod or bar, and a spring member reacting between the said lever and bar and retaining the parts in position to stop the motor.

25 2. In a stop device for motors, a brake-lever, a sliding stop rod or bar, and a spring mounted on the lever and projecting into the path of said sliding stop-rod.

30 3. In a stop device for motors, a brake-lever, a sliding stop rod or bar, and a blade-spring having one end secured to the brake-lever and a free end projecting into the path of said sliding stop rod or bar.

35 4. The combination of a brake-lever, an adjusting-screw bearing on one arm of said lever, a sliding stop rod or bar, and a spring member reacting between said lever and bar.

40 5. The combination of a brake-lever, an adjusting-screw bearing on one arm of said lever, a sliding stop rod or bar, and a spring mounted on the lever and projecting into the path of said sliding stop-rod.

45 6. The combination of a brake-lever, an adjusting-screw bearing on one arm of said lever, a sliding stop rod or bar, and a blade-spring having one end secured to said lever and a free end projecting into the path of said sliding stop rod or bar.

50 7. The combination of a brake-lever, a hollow adjusting-screw bearing on one arm of said lever, a stop rod or bar slidably mounted

in said hollow screw, and a spring member reacting between said lever and bar.

8. The combination of a brake-lever, a hollow adjusting-screw bearing on one arm of said lever, a stop rod or bar slidably mounted in said hollow screw, and a spring mounted on said lever and projecting into the path of said sliding stop-rod. 55

9. The combination of a brake-lever, a hollow adjusting-screw bearing on one arm of said lever, a stop rod or bar slidably mounted in said hollow screw, and a blade-spring having one end secured to said lever and the other end projecting into the path of said sliding stop rod or bar. 60 65

10. In a speed-regulating and stop device for motors, the combination of a brake-lever, with an adjusting-screw and sliding stop-rod for independently actuating said lever, said rod and screw being arranged one within the other. 70

11. The combination of a brake-lever, a hollow adjusting-screw in operative relation with one arm of said lever, a slidable stop rod or bar movable into and out of operative relation with the lever, and yielding retaining means engaging said rod or bar when it is slid into operative relation with the lever. 75

12. The combination of a hollow adjusting-screw and a friction-disk, a brake-lever, having one arm carrying a brake shoe or pad in operative relation with the disk and another arm in operative relation with the adjusting-screw, with a stop-rod slidable in said hollow screw, and yielding retaining means engaging said rod when it is slid into operative relation with said lever. 80 85

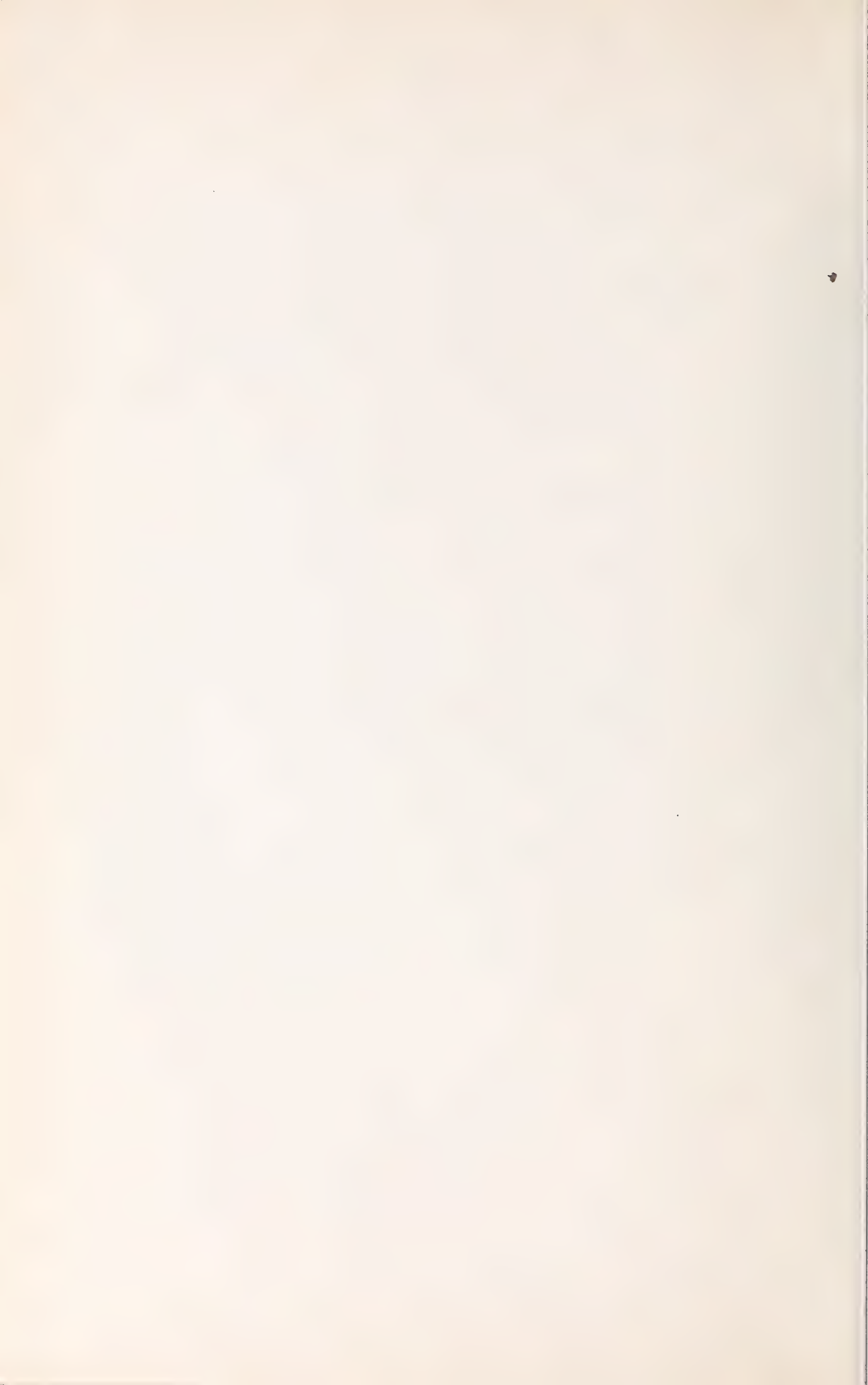
13. In a speed-regulating and stop device for motors, the combination of a brake-lever, a hollow screw, a slidable stop-rod mounted in said screw and both the screw and rod adjustable into operative relation with said lever, and yielding retaining means engaging said stop-rod when so adjusted. 90 95

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

THOMAS H. MACDONALD.

Witnesses:

A. B. KEOUGH,
M. A. FOGO.





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